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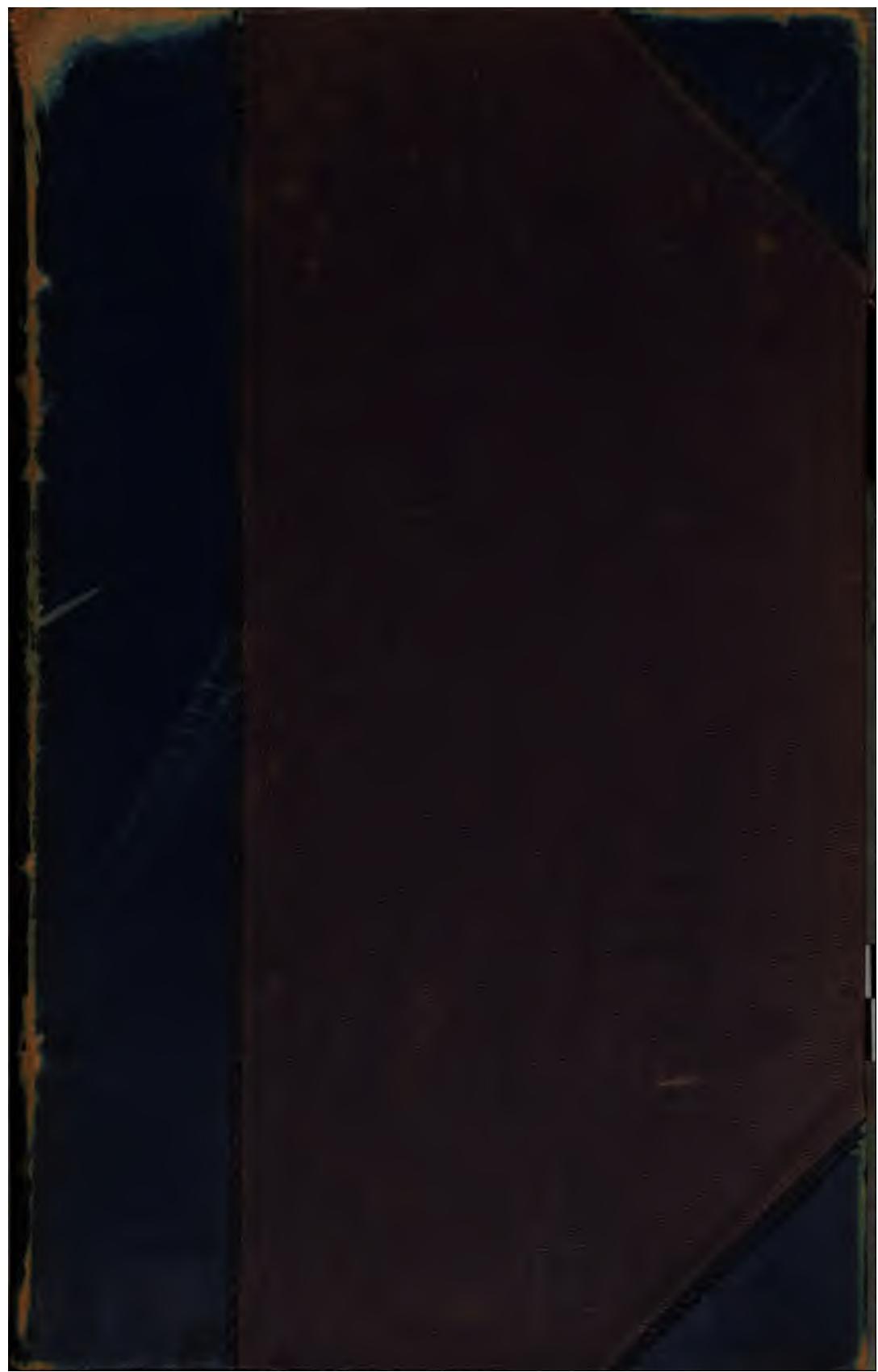
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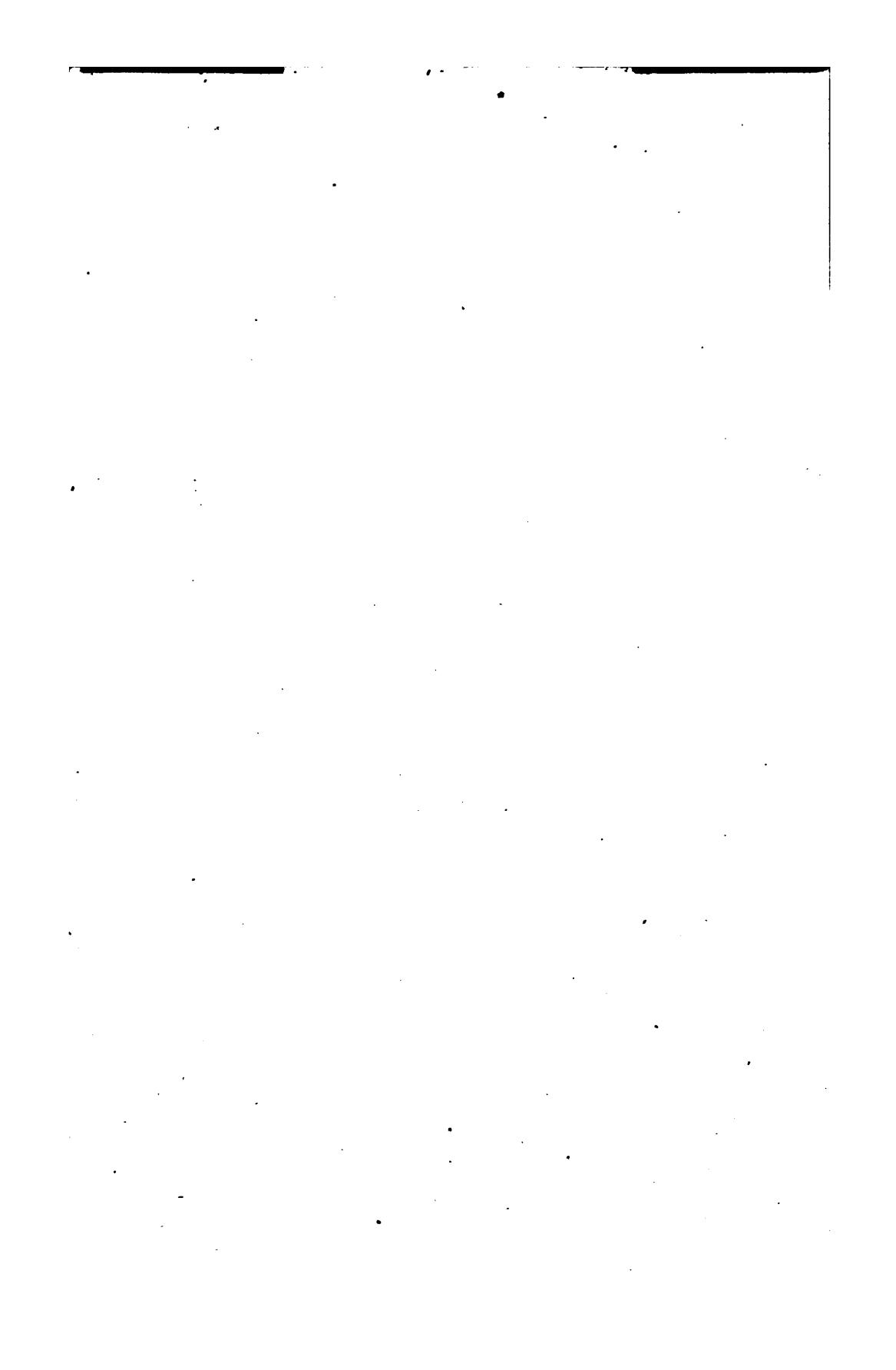
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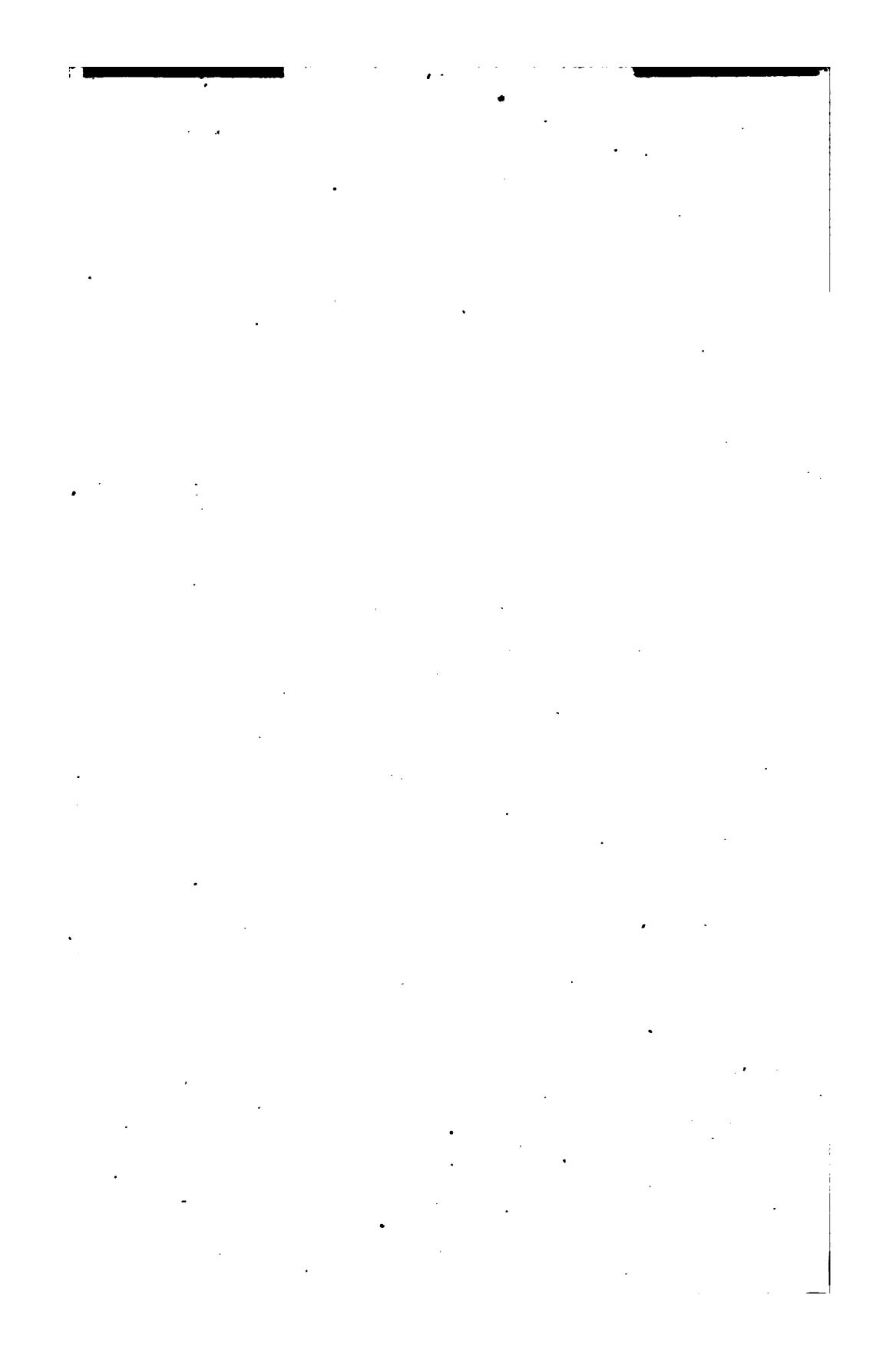


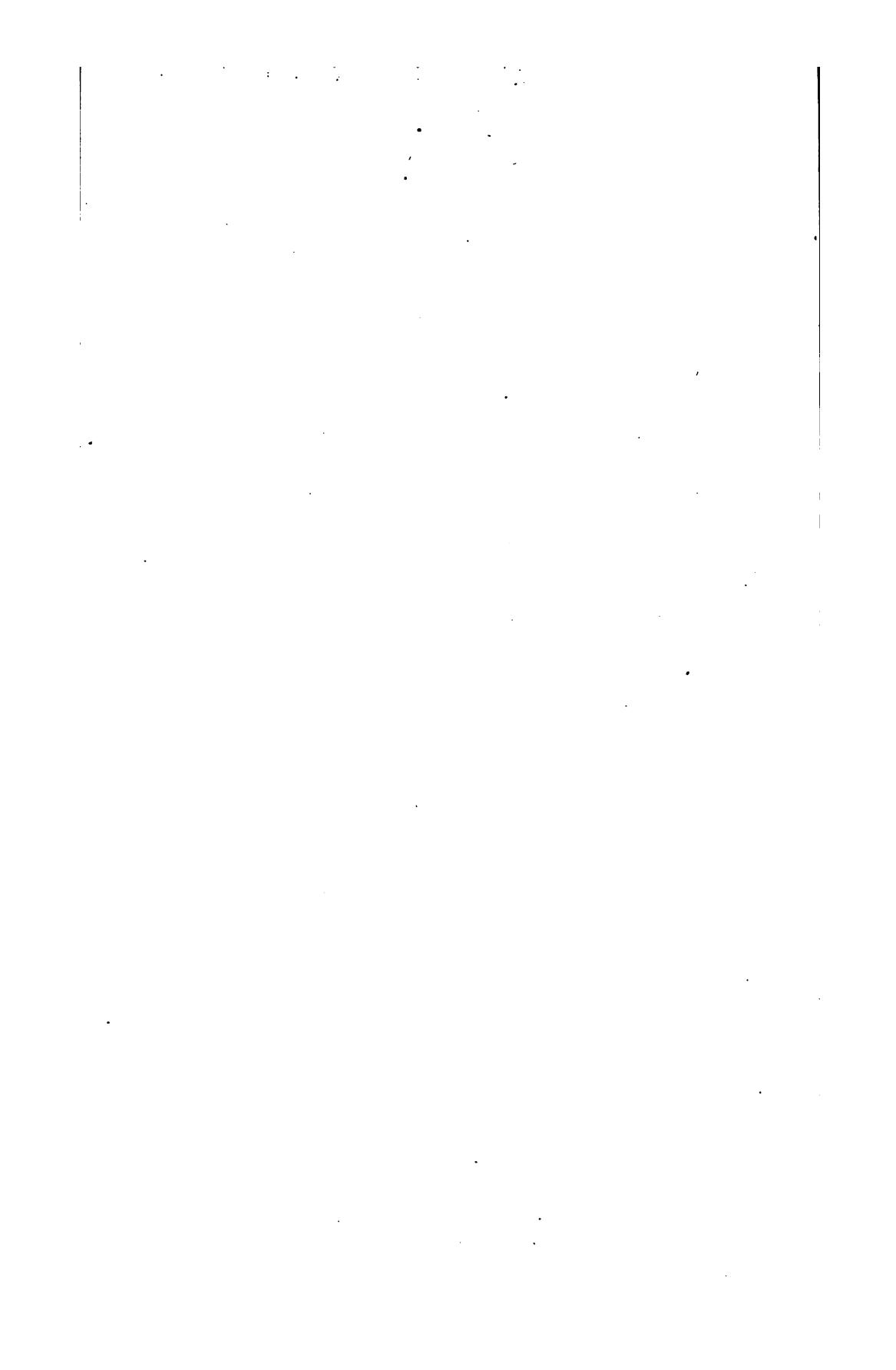




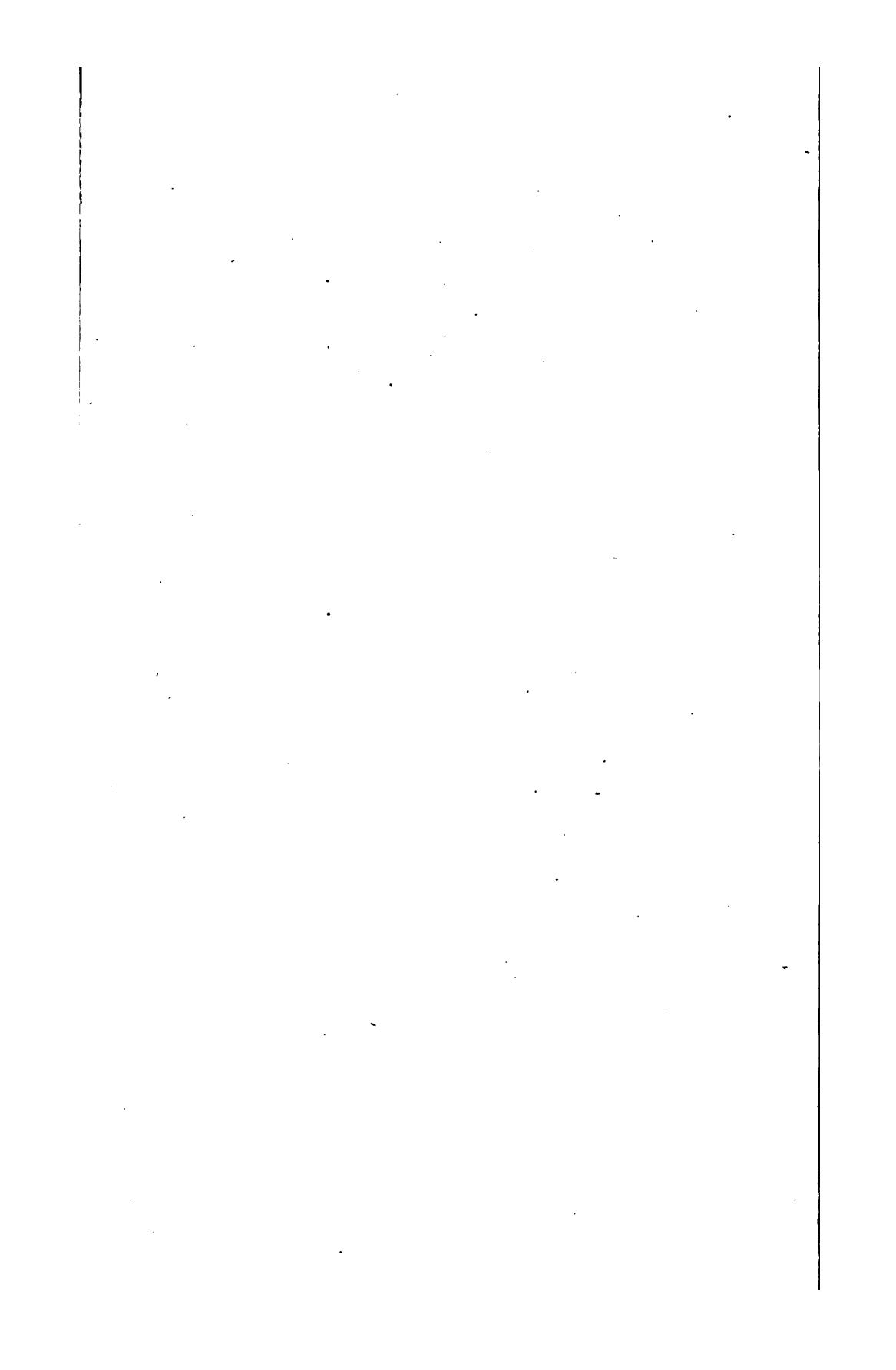
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No. I.

*Eighteen-pence.*

# POSTHUMOUS TRACTS,

NOW FIRST TRANSLATED FROM THE LATIN

BY  
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BY

JAMES JOHN GARTH WILKINSON,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS OF LONDON.

*Observe this wryne*

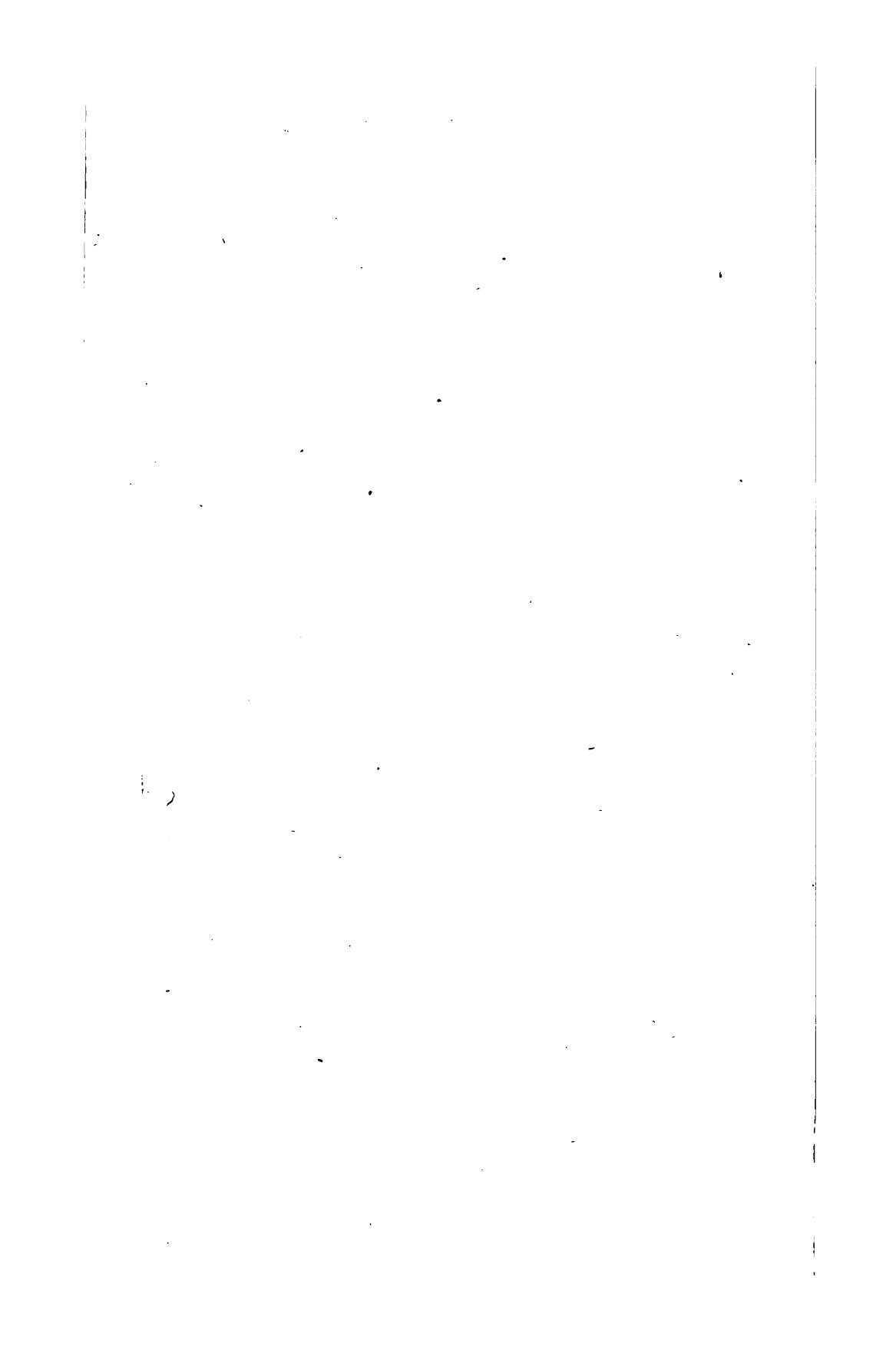
LONDON:

WILLIAM NEWBERY, 6, KING STREET, HOLBORN;  
OTIS CLAPP, SCHOOL STREET, BOSTON, U. S.

1847.

Walton & Mitchell, Printers, 24, Wardour Street.

265. i. 330



**THE WAY TO A KNOWLEDGE OF THE SOUL.**



*The way to a knowledge of the Soul.*

SEVERAL years have now elapsed since I first conceived the design of working out the problems of *rational psychology*, or what amounts to the same thing, of investigating the essence and faculties of the human soul and internal senses ; but hitherto the extreme difficulty of the subject, coupled with the vast amount of preliminary knowledge which is requisite, have warned me against treading prematurely in this direction ; for much must previously be reduced to a clear statement and a distinct order. Certain it is, that those who are but superficially informed in the elements of the sciences, or even well acquainted with one or two separate branches of knowledge, and who notwithstanding are rash enough to enter upon this field, in consequence of their ignorance of many and in some cases of the leading means, will but exert an unprofitable subtlety for the most part on empty questions, and only discuss ingenious trifles ; and according to their natural endowments, and the manner in which these are cultivated and enlightened, or as it often happens, obscured by the few sciences which such persons possess, they will involve grave truths in thorny discussions, which can have no effect upon the brains, but to occasion differences and quarrels, which no judge is competent to settle, from the trivial nature of the matter upon which the acumen and subtlety are expended. The present subject, however, is too important to be so treated : it is no arena for foils, but for naked weapons. To complete the single science of the soul, all the sciences are required that the world has ever eliminated or developed. If any shall undertake the task with less than all, it must be with the certainty of dis-

covering in the end that he is destitute of the instruments, and unequal to the toils, of so vast a work. The points which he requires, but of which unhappily he is ignorant, he must perforce obtain from himself or coin from his own mind, that is to say, he must use the imagination to supply the place of real knowledge; and how prone to error the imagination is if left to its own guidance, without the continual advice of experience, and the precepts of a true philosophy, is perfectly well known to even the least instructed. Let the reader only make the attempt for a short distance, and he will soon find himself retreating with his standards, and obliged to bring up fresh forces, before he can profitably return to the field where the peculiar battle must be won.

If we wish to deserve success in the study, it will in the first place be necessary to spare no pains, but to exert the mind to the utmost, in clearing and winning those particulars which closely surround and are subordinate to the subject in hand. The anatomy of the body, the anatomy of animal bodies in general, and especially of the cerebrum, cerebellum, medulla oblongata and spinal marrow, and also of the nerves, must open the avenues which lead to it. Without a thorough command of these portals, it is in vain to hope to penetrate the recesses of nature's temple. It is impossible to divine what nature is in the invisible sphere, excepting from what she is in the visible; or what she is in causes, excepting from what she is in those effects which ultimately strike some one of the senses. Just so it is impossible to know the nature of the inner action of the mind, without examining the face of the mind, that is to say, without investigating the brains and marrows of the mind. And even then it will still be impossible to guess how the soul unfolds her powers, without having studied the relations and connexions of all the viscera of the body,\* as well as the organs of the external senses, which contribute in their degree to enable those of the internal senses to undergo that development which will open them to the soul.

“Nature exists in totality in the smallest objects,” as Mal-

\* Swedenborg does not regard the brain as a part of the body, but by the viscera of the body he means those of the chest and abdomen.—(Tr.)

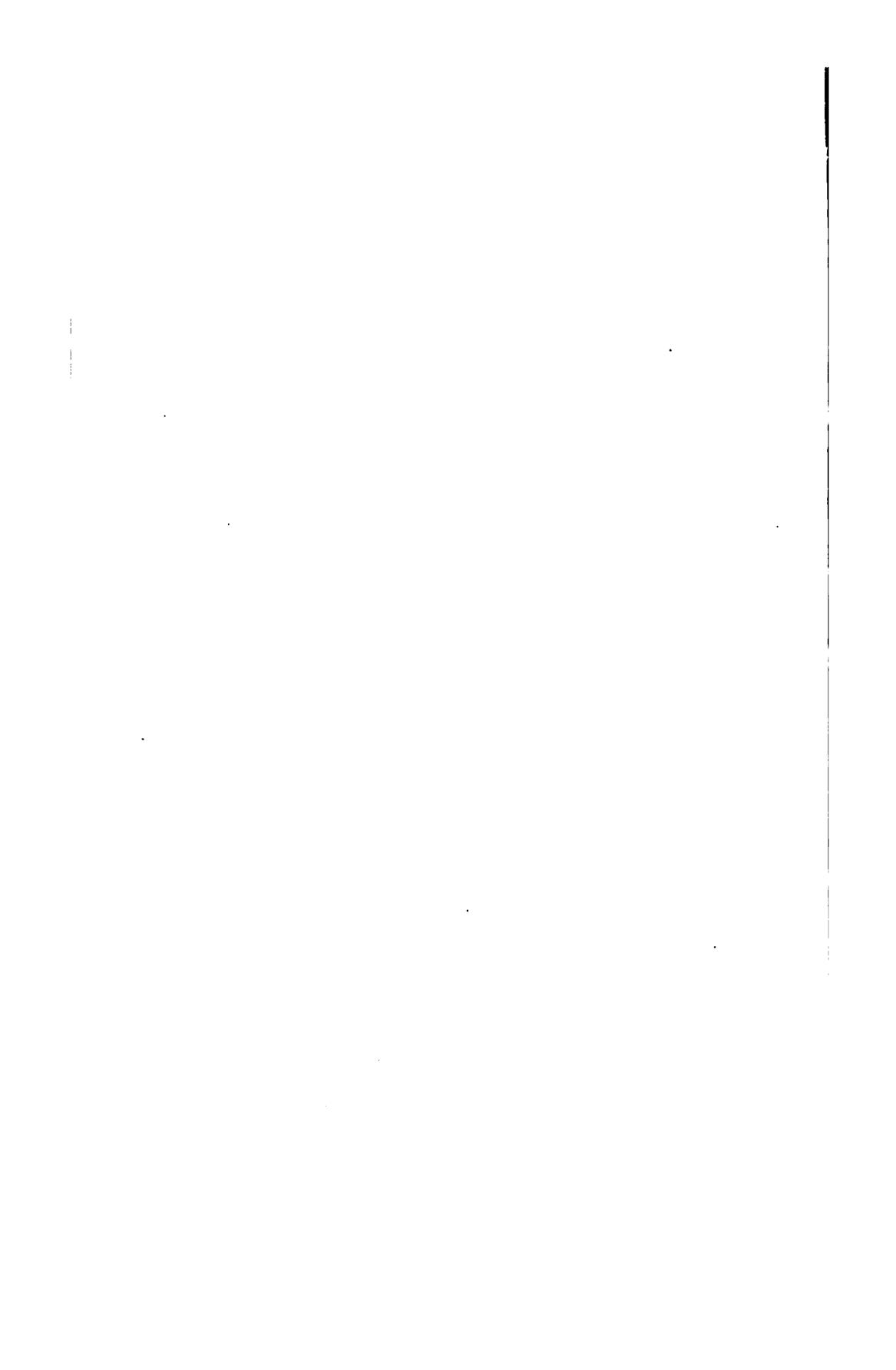
pighi well observes in his Treatise on the Silkworm.\* What-ever is presented to the eyes and to the organs of the other senses, consists of series of things beginning with the smallest, and multiplied through many degrees or stages, and which at length, after they attain to a certain considerable magnitude, appear to us as the least of things; in consequence of which it is usual at first to regard them as boundaries and causes, though far from being this, they but hide or mask real causes. For this reason, no further assistance is to be expected from them, than as supplying the mind with ultimate effects, from which it may pass to principles by an analysis of its own; besides which they are the only means that the mind can judge from *per nexus* or by relation. The path however is difficult and steep. If we confine ourselves to a few facts and phenomena, we form an idea of causes in conformity with these alone; though nothing is gained or proved, unless all the facts which surround the subject both nearly and remotely, are also in accordance, and give their consent to the same effect. And when the truth is found, consent is never absent, for truth wins the suffrage of all phenomena. All things in the world are connected, because all things spring from a single most universal principle. Hence the truth on no subject can be said to be declared, unless all things eagerly confirm it. And thus whatever results we are now to arrive at in treating of the brain, must be confirmed by all that depends upon the brain, that is to say, by the whole body, including all the viscera, organs, parts, solids and fluids; also by the records of disease, whether of the body or the mind; and furthermore by the details of experimental chemistry and physics, and the entire cohort of the other arts; inasmuch as animal nature in her domain passes in the most perfect manner through all the arts to obtain the effects that she desires. Such is the connexion of all the sciences requisite to explore the powers of the animal machine alone, that the absence of but one of them is sufficient to deprive the chain of the link which suspends it, or to leave it too feeble to bear any weight.

Nor is it enough to acquire a knowledge of all the sciences,

\* "Cum enim tota in minimis existat natura, si alicubi, magis equidem in *insectorum* moleculis id deprehendi par fuerit." *De Bombyce*, p. 1, fol., Londin., 1687.—(Tr.)

or even of rational philosophy in its various departments, unless we can reduce all things to higher and higher generalizations ; or of all the sciences form one science, sufficiently comprehensive to embrace all. The one science to which we allude, and which we denominate the Mathematical Philosophy of Universals, although hitherto unknown to the world, is still of possible attainment : and it is our wish, if ease and tranquillity of mind be granted, ourselves to lay its foundations. Without its assistance, it is idle to hope to arrive at a knowledge of the soul ; for this science is the philosophy, not of the mind, but of the soul (the mind is to be developed up to the soul, which latter admits of no development) ; in other words, it is the analysis whereby the soul comprehends its own objects. As however this science, as we said before, is altogether unknown, and it will therefore perhaps be thought fruitless to endeavor to acquire it, so before we give a statement of its principles, we shall by no means venture dogmatically to declare its use ; but shall be content with observing, that without its help it will be easier to reach the moon than to explore the soul.

**FAITH AND GOOD WORKS.**



### *Faith and Good Works.*

THERE can be no doubt that it is faith which saves, and not works separate from faith ; but, where there is a possibility of doing good works, the question is, *whether faith will save without them*, according to the dogma of the Lutherans. We reply that the affirmative seems compatible neither with the divine word of revelation, nor with human reason ; both of which lead rather to the conclusion, that *faith without works is a nullity ; and were it anything, would condemn, not save.*

First let us hear the *Holy Scripture*. Our Savior inculcated nothing more zealously, than the duty of loving our neighbor ; for he says that whoever does not love his neighbor, cannot love God, which amounts to saying, that he who does not do good works cannot have faith. In the sermon on the mount, the sum and conclusion of the whole is this, that the tree which bringeth not forth good fruits, is hewn down and cast into the fire ; for the tree is known by its fruits. In pronouncing the sentence of the last judgment, he says that the wicked are to be sent into hell, because they received not the stranger, clothed not the naked, and fed not the poor ; but those who had done these good works, he admits into heaven. All his teaching abounds with similar instances ; as in the parable of the ten virgins with the oil in their lamps ; in the parable of the sower ; of the talents ; &c., &c., &c.

The apostles testify to the same effect. John, in his epistle, urges almost exclusively the duties of love to God and the neighbor ; upon which, as Christ himself teaches us, hang all the law and the prophets. James makes open protestation of the

heinousness of faith without good works, and describes it as devilish. So also the rest of the apostles. Paul, in his epistle to the Romans, says that *it is faith which saves*, but not actions, meaning thereby, not actions without faith; but Luther, in his translation of the Bible, has added to the words of the apostle, "faith *without works*," though the latter phrase is not to be found in the sacred text; and I believe that Luther never committed a greater sin than when he made this interpolation: but God be the judge. Certain it is, that on examining and weighing all the grounds, it must appear, that faith without works is rather condemnatory than saving. Let us see therefore the meaning of the several terms, *action*, *will*, *principle of the will*, *faith*, and lastly, *love*.

*Action* is nothing but the execution or effect of the will, or it is the will itself at work. Separately considered it is no more than a mechanical thing, inasmuch as it is bodily or corporeal, and nearly resembling the effect of a machine; but the essence of the action is the will in the effect; so that action may be called perpetual will, much as motion is called perpetual effort by writers on physics. In man therefore will and action are coincident, since for action to be, will must be involved in it as an essence. Similar actions, or even the same action, may consist with a different will; and similar wills, or the same will, with a different action; in the same way as a similar motion may proceed from different efforts; or as the effort may be similar, and yet a different motion may result from it; for resisting media and circumstances determine or difference the motion resulting from the same effort. But to return to action; it is evident in all our human societies, that action is not regarded as action, but as will. Suppose that three men profess the same veneration for a monarch, all prostrating themselves at his feet, or bowing to the ground in his presence, or lauding his virtues to the skies; but one, with the will or wish to deceive him, the second with a view to his own reward, the third, to display in a befitting manner the honest veneration of his heart. The action of all three is the same; yet it is not the same when viewed from the will, which is heterogeneous or different in each. Therefore when the king has discovered the will of each, he hates the action of the one, and loves that of the other;

and his hatred for the former is all the greater, in proportion as the action nearly assimilates to the action of those who display the outward signs of a real inward veneration. Nothing therefore is here considered in the action, gesture, motion of the body, or speech, but the will alone ; which shews that action may properly be termed perpetual will, as motion may be termed perpetual effort.

The *will* also proceeds from principles, or from a principle, of its own, as action proceeds from will. There may be different principles to a single will, as different wills to a single action ; in which respect the principle is considered as determinant and efficient, and the action as the determinate and effect ; the will being the mean between the two. Therefore action is no other than the principle alone ; for the cause of the cause is also the cause of the thing caused. Thus relatively action is nothing but a mechanical thing, like the motion of a machine ; and the will is like the effort in the motion ; and it is the principle alone which constitutes the essence of action, because it constitutes the essence of will ; for by the common rule, there are all the essentials in effort that there are in motion, or what amounts to the same, there are all the essentials in will that there are in action. We repeat then that the principle is the only thing that constitutes the essence of action, because it constitutes the essence of will. Hence in civilized life all actions are examined and estimated by their *principles*, or in other words, by their intentions, or the ends for which they are willed and done. Moreover in common discourse the word will is used synonymously with principle or intention, being regarded as an identical term. Will, however, is the distinctive property of man, who alone is privileged to will from antecedent principles, or from a foregone intuition of ends : it does not exist in the brute creation.

The word *principle* implies whatever determines the will, and gives it a characteristic quality. There are principles which are *physical*, that is to say, proper to the body and the blood ; such are the different affections of the animus, the pleasures of the same, the allurements of the external senses, the delights of the world, &c. There are also *rational* principles, or principles that regard an end, and which relatively thereto, viewed

in conjunction with means, determine and enter the will, which thenceforth is properly denominated will. Again, there are principles that govern the will, which may be called *divine* principles; where the end that should determine the will to action is too ulterior to terminate in this life. This principle, however, belongs to a higher degree, and is of a sublimer character; for it does not depend upon ourselves, and it governs all other principles; so that indeed it must not be considered as a principle, but as a superior will. Yet as it ultimately enters the human will, and determines it, so it may be designated as a principle ascribable to God.

*Faith* is that peculiar faculty in man whereby he believes in Almighty God, in Christ the Savior of the world, and in all that the revealed Word of the Sacred Scripture dictates: consequently it is a principle of the will, but divine, or ascribable to God alone. When faith as a principle enters the will, and thereafter the action, then the action is not considered as action but as faith.

*Love* exactly keeps pace with faith, for whoever has faith amounting to confidence in God, has also the accompaniment of love as inseparable from faith; for the grace of God is universal, in that when He gives faith he also gives love, and the love increases in the same degree as the faith; and when the faith is conjoined with love, it then for the first time constitutes saving or true faith. Historical faith, however, is only the science or knowledge of what really is, and even the devils have it, for they know that there is a God Who is such as He is described in the Holy Scriptures: but this cannot justly be termed faith, but knowledge. We must therefore separate this meaning of faith, which arises entirely from the double signification of terms, from saving faith, which is faith conjoined with love. Thus faith and love are in these respects one, for granting the one, the other is granted also; and notwithstanding that each appears to be distinct, yet the two are so united, that God gives love in the same degree as faith; and with love, confidence; and with confidence, veneration, and acknowledgment of his grace. Thus as love is the principle of the will, so it is the essence of action.

Let us now argue on these premises. What then is will?—

When one can do what one wishes. And what is endeavor?—When the subject can effect what it endeavors. It may be called will and endeavor when doing and effecting are impossible; but if the means of doing are conceded, and no action takes place, will and endeavor cannot be accounted real, but rather are mere abstractions. To take a vulgar illustration. We may say that this tendon possesses an elastic power, or an endeavor to recover itself after being flexed; and so long as resistance hinders, it is in a perpetual effort and *nitus* to act or react. But when it has the power and opportunity to act, and yet does not act, what endeavor or elastic force has it? It is clear that it has none; and this from the fact, that it does not act when the removal of all resistance enables it to do so. And if it can, and does not, it is a sign that it counteracts its own endeavor, and has in it principles contrary to the endeavor, or which restrain, and destroy, its elasticity. Consequently, when it does not act, elasticity or endeavor cannot be predicated of it, or if predicated, the elasticity must be regarded as destroyed by a contrary principle. The same holds of faith and action. Faith is a principle of the will, and the will is the principle of action. If action does not ensue when it can, what becomes of the will? It is either an abstraction or nonentity, or else it is influenced by a principle opposed to faith. The tree then is known only by the fruit, and faith by works, according to the impressive words of our Savior and the apostles; but not by itself without good works; for this is contrary to the Word of God.

This may be illustrated still more adequately by other than merely physical similes, like that which we lately borrowed from the tendons; thus it may be illustrated by love, friendship, and an infinity of other affections, which enter the will, to constitute its principles. The simile already adopted is however sufficient, as being of a physical character, it the better impresses the senses, which are within the sphere of physics. For this reason it is that comparisons derived from trees, from oil, from seed, from fields, and from feasts, are made use of to illustrate the same subject in the Holy Scripture. The comparison is more closely appropriate than at first might be supposed. Indeed the will cannot be more fitly compared, than with endeavor, and action, than with motion. Only add living

force, which is the predicate of the soul, to endeavor, and you have will; and by adding the same to motion as an effect, you have action: and so forth.

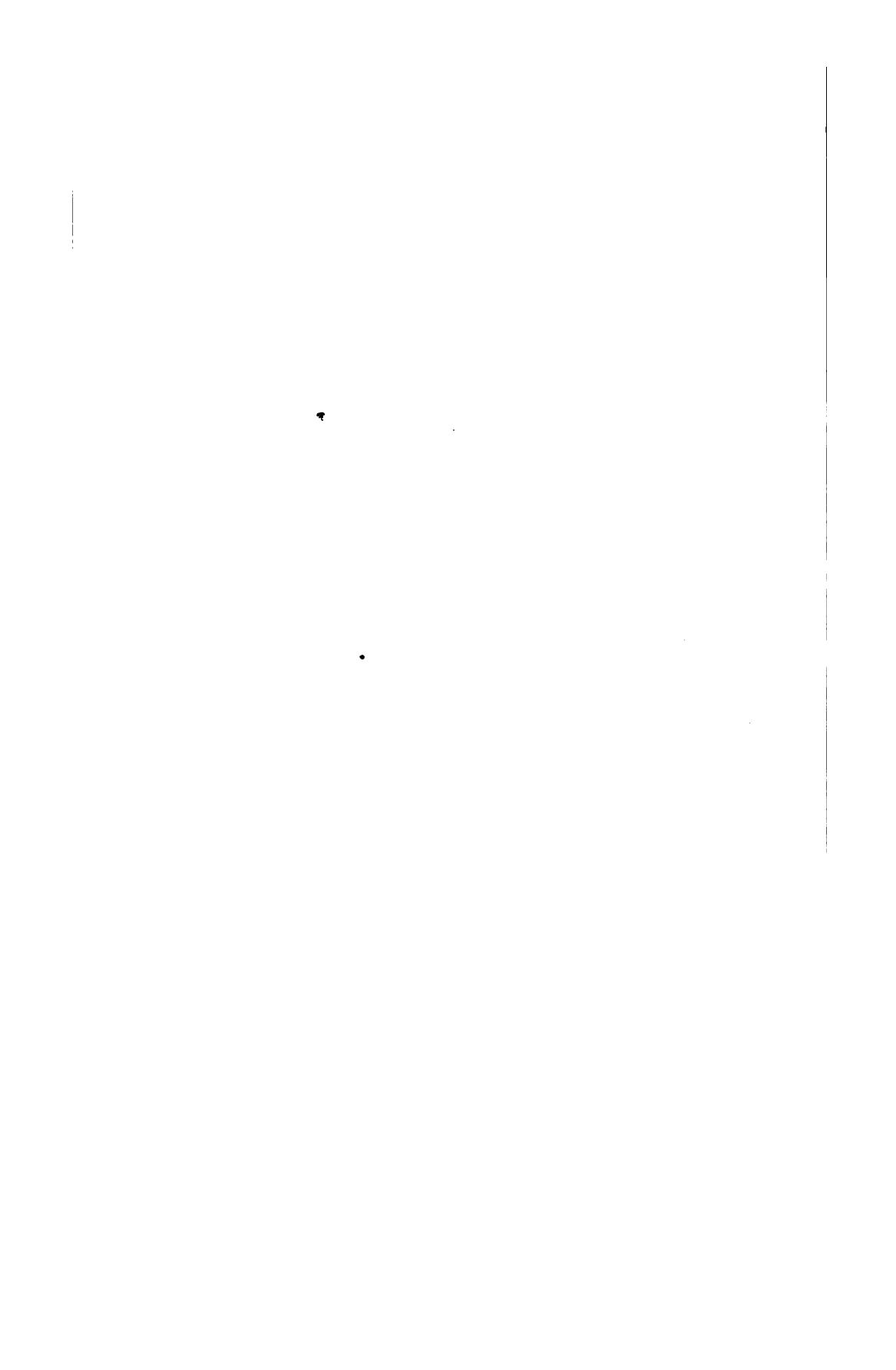
It follows therefore, that the doctrine that *faith without works saves*, is contrary to reason; but that the doctrine that *faith in works saves*, is in conformity to reason. In a certain sense indeed it may be true, that *faith saves, and not works*, that is to say, if the works are regarded as separate from faith, for then, theologically, they are not good works. Also that *true faith saves, when there is no power or possibility of doing good works.* For in this case the will of the faith may be compared to an endeavor which cannot pass into act, on account of the resistance being equal to the effort put forth by the subject: like the elasticity of a flexed tendon, which constantly reacts, or tends to act, but there may be a resistance equal to the endeavor, which restrains it from acting. However, as soon as the resistance is removed, or the impossibility subtracted, action takes place. It will indeed rarely if ever happen that saving faith will find it absolutely impossible to act; provided it clearly endeavors to act, removing as it were impossibilities; in which case that one mite which the poor widow casts into the treasury, will be of more avail than the golden gifts of the rich. Moreover God supplies possibilities to prove our faith; possibilities fitted to individuals; thus he allowed Abraham to offer up his son; to say nothing of numberless other instances which are to be found in the Sacred Scriptures.

There is then no doubt remaining, that love to God involves love to the neighbor. Love to the neighbor is identical with the performance of good works, or with loving him in reality, that is to say, with performing towards him the duties of love, without which love is a nullity. In the same way self-love not only involves wishing well to oneself, but also doing well. Therefore if instead of love to the neighbor we make use of its equivalent or value, namely, the performance of good works, we shall find that saving faith, which cannot be separated from love to God, necessarily involves good actions, or the actual exercise of love to the members of the society in which we live. It is all the same whether it be to those who are loved by God, or to those who are not loved. For it is impossible to say who

are loved by God, and who are not ; for a good soul may exist in a bad body ; and *vice versd* ; as there are many examples to shew. To judge of others therefore belongs to God alone, and not to us ; wherefore God has said, “*Judge not, that ye be not judged.*” Thus if from a principle of love to God, or from true faith, we only do our duty to our neighbor who has need of our services, we have done enough ; and we have no right to be partial in our benefits, as if one individual was more loved of God than another ; for in such a judgment we are almost sure to be deceived. Our province lies in judging of actions, with a view to the conservation of society ; but it is reserved for God to judge of the principles of action. It is assigned to us to pronounce sentence on our fellow men, and to condemn the body to merited punishment, or even to death itself ; but the soul is always left to the judgment of the omniscient God.

The *conclusion* is, that there is no love to God if there be none to the neighbor ; or that there is no faith, if there be no works ; and that if there be love or faith apart from works, they are destroyed by various principles contrary to the love of God and to genuine faith ; and in this way love and faith are what condemn us. Therefore *faith without works* is a phrase involving a contradiction ; a phrase in which the predicate ignores the subject ; a position of something from nothing, of the possible from the impossible ; a distinction inadmissible in this life. In the future life, love to God may be said to exist without the performance of the duties of love to the neighbor. True ; but in this case love and faith are not considered as saving ; for the soul is already either saved or condemned ; and all the means, which consist in doing the duties of love to the neighbor,\* are taken away, because the body, which is the subject of action, is extinct. Therefore sumptuous Dives wished to return to life, that he might be able to minister to poor Lazarus.

\* But on this subject see the author’s work on *Heaven and Hell*, on the Occupations of the Angels in Heaven, where it is shewn that “every one there performs a use ; for the Lord’s kingdom is a kingdom of uses.” Also that in heaven there are ecclesiastical, civil and domestic uses ; and that the employments there are too abundant for enumeration, those on earth being few in comparison : furthermore that man after death is in a perfect human form, and possessed of *all the senses*, memory, thought, and affection, that he had in the world ; and that when he enters the other life, he is in a body, as he was in the world.—(Tr.)



## **THE RED BLOOD.**

*N.B. The Blood contains all organic forms from the primary spiritual to the ultimate angular, and in this respect is the compendium and complex of all the forms of nature.*

## THE RED BLOOD.

### CHAPTER I.

*The blood is that thick, red, heavy humor which circulates through the heart, arteries, and veins.*

The blood is palpably distinguished from the other humors of the body by its redness alone. The vessels through which it runs are the arteries and veins. The heart, comprising the two auricles and the two ventricles, is the first and last term, or the starting point and goal, where both the blood and the vessels meet. The circulating current runs from the left ventricle of the heart to the great artery or aorta, and to the lesser arteries; from the arteries to the smallest veins, and to the grand vein; from the veins to the right auricle and ventricle of the heart, and thence, through the lungs, to the left auricle. This circle and gyre constitutes the great sphere of the heart; and the vessels collectively constitute the arterial and venous system, or the heart in the largest sense; for the heart is as it were most present in every point of all the arteries, and in every point of all the veins; the vessels being its channels of determination, or rays of operation.

### CHAPTER II.

*The parts of the genuine or red blood are spherical in shape, and consist of globules surrounded with serum.*

The fluid mass which gushes out when a vein is opened, is

all denominated blood; but the pure and genuine blood is distinguished by its intense redness. The blood is surrounded by a serum or water of various degrees of pellucidity, and which is sometimes turbid, gray or glaucous, yellow, brown, or greenish, and full of saline and urinous elements. We are here, however, speaking only of the pure and genuine blood, which consists of round globules, as shewn by the microscope. The figure of the blood particles was unknown to the ancients; their internal form or structure is even now unknown to us; it begins however to be somewhat plainer, from the revelations of the microscope; although obscurity still preponderates. Nevertheless, we know enough to enable us to judge from what we see, of the other particulars which are beyond our vision.

## CHAPTER III.

*Each blood globule contains within it, and carries in its bosom, details more numerous than the eye can ever discover, or the mind conceive.*

There is abundant experience at the present day, to prove that the blood globule is not uniform, simple, or devoid of parts. Indeed it admits of resolution or disintegration. In the capillaries it actually divides into lesser globules, and these into least, which are so minute as to escape our vision. When the blood is exposed to a moderate heat, and so distilled, it is converted into an ardent spirit, with oils and phlegm; moreover when the globule is resolved, it yields a large quantity of volatile salts, which crystallize under the form of a regular vegetation. The more considerable parts which come over, are shewn by the microscope to consist of triangular and square corpuscles. To this extent the high experience of microscopic vision has really penetrated. And we may augur from it, that details more multiple and more perfect still, lie hidden in the lesser globules, and again in the least. These however we cannot expect to see distinctly, for we are unable to see the globules that contain them; as when we cannot see some small insect, which equals only the minutest ray of microscopic light, it

would be in vain to expect to see its little viscera, or the structure of its exquisitely fine members. Now the case is the same with the blood-globule; although from what we have found and know it is sufficiently certain, that if all its contents could be discovered, and if it could be magnified to the size of the human brain, an infinity of new details would come to light, and nevertheless an infinity would still remain unseen. For the blood is the repository and the seminary of all things in the body, and contains in act whatever has preceded it in the kingdom, and in potency whatever comes after it, or will come after it. For this reason it is, that the universal body is sick when the blood is sick, and *vice versa*; and that in the greater number of diseases, it is sufficient to find a medicine for the blood alone, to restore the body to health.

## CHAPTER IV.

*The red blood globule admits of division into six lesser and pellucid globules.*

Six lesser globules have been actually seen in one large blood globule; and indeed the mode in which they are united, and the relative position which they occupy to each other, have been described and drawn, and wax models representing the whole have been constructed. Moreover, the several lesser globules have been seen in the act of separating from the compound body; in which case their pellucidity was manifest, and as they came away from the red globule, they were observed to penetrate the capillary vessels. Furthermore experience has shewn, that these prior or simpler globules are themselves divisible into still lesser ones, and even into least, where sight can follow them no longer. All these particulars must be received as true, because the observer,\* and the witnesses to his observations, are worthy of credit. Now as the parts of the red blood admit of division into simpler parts, it follows that the latter, which are the prior and simpler constituents of the

\* Leeuwenhoek.—(Tr.)

blood particles, are not the red blood, but constitute a purer, inner, and more perfect blood. The change in color will not alter the essence, nor consequently the name. Like the red blood, this pellucid blood circulates through vessels, and pursues its course where the grosser fluid cannot follow. We therefore term this humor, which consists of pellucid spheres, the purer or middle blood.

## CHAPTER V.

*In the red blood globule there are also a number of saline and urinous particles, of different shapes.*

Besides the lesser pellucid globules which constitute the large globule of the red blood, there are also in the blood, certain angular, or saline and earthy parts. These also have been seen and described, yet only those that are square or cubical; the others perhaps being too minute for observation. It may however be inferred that each red globule contains triangular as well as cubical forms, from the consideration, that when the six lesser globules are in their full whirl and speed of fluxion, they could not cohere together, were there not intrinsic means provided to strengthen and hold them in combination. The blood globules are flexible and soft, and capable of being extended in length to two or three times their diameter. And although they admit of being extended, and even divided, yet they are all of equal size. Which is a plain enough proof, that they have some fulcrum, support and stay, to ensure their cohesion under the compound form. The particles of salts, both the primitive and the compound, are angular forms; that is to say, they are inert and figured, or consist of extremely minute trigons and cubes, hollowed out so as exactly to fit the convexity of fluent and active parts; being made and formed with a view to combining or copulating with round particles, which are the genuine parts of motion; to temper and moderate their activity, and to cause them to combine further, by successive degrees, into new and more compound forms. Therefore in order that the six globules may unite and cohere in one, they must have

a little cube in the middle with six sides and eight angles, and with each of its sides hollowed out: and if any humor, however intense its fluxion, comes into the mould of these hollow sides, it will of necessity fall into globules, each of a size and convexity answering to the size and concavity of the side. But to make the globules firm and tight, still other and lesser parts, and these of a triangular form, must be fitted to the several angles or angular interstices, of which there are eight; and when these triangles are properly inserted, the whole will then be a stable compound. The cube in the middle which serves as the basement or stylobate of the compound globule, is no other than a particle of common salt. The triangular forms are volatile and urinous salts. Of the latter the ardent spirits are composed, as well as all the various species of oils which the blood yields on distillation. Particles of the kind float about in the serum, and are thereby supplied or offered to the blood. And that these are indeed the constituents which escape in large quantities from the blood when it is resolved or disintegrated, is clear from the crystalline vegetation which they then go to form; also from the little cubes that have been observed, when this process takes place; and from similar cubes being found in the caput mortuum after blood is distilled. And further from the consideration, that without an application of parts like what we have mentioned, composition would be impossible; and above all, the red blood could never be the repository of the humors which precede it, and the seminary of those which follow it. On the other hand, by the mutual application of the triangular, cubic, and round forms, we have not only a firm and coherent globule, but one which is spherical, voluble, flexible, fluid, adapted to any straitness of passage, soluble, ruddy, heavy, warm, and embracing the prior elements of the whole mineral and vegetable kingdoms; all of which in a moment spontaneously glide into one to form it, and it holds and keeps them all on the happiest terms of mutual compact, and arranged in the most admirable order; while the spirituous substance, which resides in the lesser globules, is the single principle which reigns in the assemblage.

## CHAPTER VI.

*The redness of the blood arises from the interposition in each globule of salino-volatile particles.*

If in the middle of the blood globule there be a stay or fulcrum consisting of a little cube with six sides and eight angles, and if each angular interstice which is left between the lesser globules, have minute trigons and cubes inserted in it, that is to say, salino-urinous particles—in this case it is impossible that redness should not be produced. Color is the modification and variegation of the rays of light, and the red species cannot fail to arise, wherever the rays pass through an object thus regularly interpolated with trigons and cubes; for as they fall,—as they are incident,—they penetrate with perpetual refraction to the little cube which fulfils the place of a centre, and there undergoing repercussion, they gyrate with a giddy whirl around the lesser globules which lie at the sides. Thus much is known with certainty, that nothing produces the various kinds and forms of shaded light with greater distinctness or in more exquisite purity, than volatile, urinous and alkaline salts, or than sulphurs, inasmuch as all these are in reality triangular corpuscles, or prisms and quadrangles, excavated laterally: which when they are distributed or packed in an orderly manner so as to form a compound body, are sure to result in a general modification of light, either red, green, or yellow, and to display a surface that is really distinct and comprehensible only under the condition of a general visual perception. The result is different when the proportion of light or rather whiteness in the sphere is less, under which circumstances green or blue are generated; but yellow, when the proportion is greater. This is proved by the transmission of the solar rays through glass globes, through bubbles of water, and through steam, also through prisms variously placed; by the phenomenon of colors in those places where shade begins to be markedly discriminated by light; by various chemical mixtures and precipitations; by the whole vegetable kingdom, so richly adorned with colored objects; and by an infinity of other instances; from a careful survey of all

of which it is very clear that there is nothing at all real\* in color. On the same principles it is also evident why the blood is more or less red at different times and in different individuals, and why is it sometimes comparatively pale, yellow, or green, or even tinged with unseemly black.

## CHAPTER VII.

*The gravity of the red blood results from the same saline and urinous particles which are contained in the globules.*

The red blood is heavier than water, in which when placed it sinks to the bottom. The cause of its gravity necessarily lies in parts endowed with *vis inertiae* and resistance, as are all those which are angular and terrestrial, or which belong to the mineral kingdom. The force that determines the gravity of bodies evidently resides in the purest circumambient atmospheres, which press all points of non-elastic bodies with perfectly active force and unerring direction towards the general centre. Thus gravity or centripetency originates from cosmical substances destitute of both gravity and levity. It follows that the saline-urinous and volatile particles in the blood globules, of which we spoke above, are the proximate causes of the gravity of the blood. Therefore the quantity of these particles may be inferred from the gravity of the blood. And it would be worth while to institute a comparison between similar volumes of the red and of the purer blood. The heavier blood is for the most part harder, because impregnated with a superabundance of earthy elements; while the lighter blood is relatively soft, as well as tinged with a more grateful redness.

\* In asserting that color is not real, the author means that color is not a thing (*res*), but the modification of a thing.—(Tr.)

## CHAPTER VIII.

*The warmth of the blood differs in different cases, and arises from different causes.*

Animal life in its most essential form gives the blood its proper or peculiar heat, which is intimately latent in the fundamental constitution of all its parts; but this heat is a mild warmth, which kindly and gently fosters the viscera, and lights up the fires of all the laboratories scattered through the system, for the due performance of their various works. This is sometimes increased even to fervid intensity by the movements of the animus, or by disease of the body, and withers the parched and exhausted viscera. At other times it falls and fails, often to such an extent, that the members of the frame shiver from its absence. Thus as soon as the blood is taken from its native veins, it loses its heat, and begins to die, to be converted into clot and sanies, and to thicken into a viscid and pultaceous slime. The proper heat of the blood is then of the mildest kind; greater in youth than at other periods, and even sensible to the touch; but in its intense degree amounting to febrile ardor. But there is no keener excitant of heat than volatile urinous matters, such as lie in the bosom of sulphurs, bitumens, resins, and of various kinds of wax, oil, spirits, nitres, and vegetables. And there is nothing which more speedily and naturally promotes it, than the auras of the world, and their analogues, the spirituous fluids of the animal kingdom. By consequence heat has no readier generator than the blood, which lodges both the volatile urinous and sulphurous matters we have mentioned, and the animal spirit, entering into intimate union and consort with them. Thus the natural heat increases with the increase of the spirituous fluid, including its volatile adjuncts, as during childhood; it decreases with the decrease of the same, as in old age; it varies as the character of the blood is altered by the vast diversity of causes which affect it; it is perpetuated by the continual resolution and combination of the particles, as well as by the continual exercitation of the blood by the brains. Thus it appears that there is nothing real in heat, fire, flame, or cold, but that they are the affections and qualities of substances either vibrating and gyrating, or on the other hand, at rest.

## CHAPTER IX.

*The genuine blood is relatively soft, and admits of extension and division; and its softness arises from the purer and white blood which lies in the red globules.*

It is now so well established by microscopic observation, that the genuine blood is soft and flexible, and may be extended in length to twice or thrice its breadth, as well as divided into parts, that no room is left to doubt of the fact. The microscopists have seen the blood globule in the capillaries compressed into an oblong or oval figure, and ultimately broken up into a number of other particles and globules. But if the proofs which instructs us of the softness, extensility and divisibility of the globules of blood, be sufficiently ample to make doubt impossible, we have to enquire into the cause of the phenomena. And here the same experience shews, that the lesser globules, of which each larger globule contains six, are the parts that yield, inasmuch as they may be drawn out till they form a kind of thread, while the larger globule only admits of being compressed. Hence the cause of the flexibility resides in the lesser globules, but not in the salino-urinous and sulphurous particles, which latter are hard, inert and passive, and only made use of as means of combination. Those lesser globules that constitute the purer blood, and those that constitute the animal spirit, are so soft and flexible as to yield to the smallest impulse, to the least assailant force. The perfection of the entities of nature's purer sphere lies in their pliability, in their suffering and doing, undergoing passion and exercising action, proportionally and correspondently; or in representing the most perfect forces of nature; which cannot be done by hardness and gravity, inasmuch as hard bodies absorb and extinguish influences and forces; while on the other hand elasticity and a yielding nature, and passive power equal to active, suffer no force to be lost, but receive it, and give it forth again in all its integrity to the neighboring parts as well as to the universal volume. Moreover, if the perfection of the purer entities consists in mutability of state, it follows that they must be soft, yielding and flexible; or active to the same degree as passive; otherwise they could not accom-

modate themselves to all the various forces ; and the soul could neither feel, imagine, think, nor discriminate the minute differences in represented objects, which are all of them forms : neither could the animal spirit run through the fibres, and determine into act whatever the mind endeavors and wishes. Therefore the purer blood and the animal spirit, which is again a simpler humor of the animal kingdom, are the causes of the flexibility observed in the blood globules. And it is evident from this in what the composition of the blood globules consists.

## CHAPTER X.

*In the living body the red blood undergoes perpetual dissolution, purification and renewal.*

We have shewn that the globules of the red blood are dissolved into lesser and pellucid globules ; that they are compounded or renewed follows from this, that the quantity of blood in the veins and arteries remains the same notwithstanding. This resolution and recompounding of the blood produces that circulation which we term the circle of life ; a circulation from the vessels to the fibres, and from the fibres to the vessels. Thus the blood loses nothing by death or dissolution, but only in every instance returns to its first essence and nature ; and from this again reverts to its general, or to its last or ultimate form. But when the compound body is dissolved, or the red blood dies, it does not cease to exist, but always returns to a purer life, and is gathered to its parent, the soul. So each moment life and death alternate in us, and every particle of the blood represents the general condition of the body. Indeed were it not for the continual dissolution and renovation of the blood, the food would be useless to the body. For fresh elements require to be constantly taken into the system to compose the blood anew, as obsolete and antiquated matters are thrown out. Therefore it is that the blood is always surrounded with an abundance of serum, to supply and offer these elements. Moreover it requires to be continually purified, to serve all the uses of animal nature, *i.e.*, to give birth to the numerous humors

with which the viscera abound. Again it must be dissolved and renewed in order to be purified, and to be always in a state of fitness and adaptability; for when too hard or compact, it will yield or give out nothing, and will never open its bosom treasures. Thus the fortune and happy condition of bodily life consist in the softness and divisibility, and not in the hardness, of the blood. Whatever is vital, is soft, patient and yielding. It is the contrary of vital, if hard, sluggish and inert.

## CHAPTER XI.

*The globule of the red blood contains within it the purer blood and the animal spirit, and the latter, the purest essence of the body, that is to say, the soul; whereby the red blood is a spirituous and animated humor.*

The blood is the repository of all the prior or purer humors in the body, and the seminary of all the posterior or grosser; wherefore it contains the prior in actuality, and the posterior in potency. The animal spirit descends from the very essence and substance of the soul; the purer or middle blood from the animal spirit; and the red blood from the purer. It is only by this succession and derivation that the soul can be present to the several parts of the body; for to be present with all, it must be involved in all in the above order. The intimate principle then that lies in the depth of the red blood, is the very essence of the soul, which in ruling and determining the blood, rules also and determines all that depends upon the blood. Unless the blood contained within it the prior animal essences, the members of the prior sphere could never provide for those of the posterior, nor the posterior be related to the prior, nor would there be any mutual respectiveness, dependence, harmony, or real correspondence. Therefore the blood is spirituous and animated.

## CHAPTER XII.

*The red blood partakes almost equally of the soul and the body, and may be termed both spiritual and material.*

The blood partakes of the soul, inasmuch as it involves the purer blood ; this, the animal spirit ; and this again, the prime essence or the soul. It partakes of the body at the same time, inasmuch as it contains earthy, inert and saline particles, which give it gravity, color, a comparatively hard consistence, and other attributes, which are the qualities of mere body, and attach to material things : besides which, the blood-globules are of a circular form, and in this way also are bodily. The quantity of space which the soul and the body occupy respectively in the blood globule, may also be calculated, by comparing the internal space filled by the little saline cube, and the angular interstices containing the smaller trigons, with the space of the globules ; though it is to be observed that there are most pure elements of a similar but purer nature in these very globules, to give their frame-work strength, to temper their activity, and to fix their volatility.

## CHAPTER XIII.

*The red blood may be called the bodily soul.*

Considered in itself the blood is not the soul, but the soul is in it ; on which condition alone can the soul govern and determine the ultimate forms which are so far removed from it. Nature is ever acting on her own rules and measured proportions. To act on the parts of the last sphere, she must act through those of the middle sphere, and be with them, and in them. Thus as the blood is the soul's vicegerent in the ultimates of the kingdom, so it may be termed the bodily soul, and subsidiary lieutenant force ; particularly in those subjects that allow themselves to be governed by the body, and not by the spirit ; such for example as brute animals, and their likenesses in human society. In these, instead of the soul governing the body, the blood and the body have dominion over the soul.

## CHAPTER XIV.

*There is a common and obscure life in the red blood.*

The soul is the only vital essence, or the only essence in which life abides; all other things owe their possession of life to the soul. Such is the case with the blood, in the inmost of which the soul dwells, with life in its train. The blood, however, is but the general or common mansion of the soul, and is not distinctly determined by fibres, and therefore its life is obscure, destitute of sense and all intellectual faculty. Essential determination, or form, is what causes us to live distinctively and individually. Thus from the form we may infer the peculiar life, and hence also the peculiar life of the blood, which becomes a little more distinct in being determined by the arteries and veins; although it never reaches the point which may be called sensual life.

## CHAPTER XV.

*From the red blood we may judge of the nature of the purer blood; and from the purer blood, the nature of the animal spirit; and from the animal spirit, that of the soul; with the help, however, of the doctrine of forms, order and degrees.*

We may judge by the visible and the ultimate of the invisible and the prior, or by the compound of the simple. Compounds can have nothing truly essential in them but the first essence. The nature of the red blood is exposed to sight, but not the nature of the purer blood; still less, of the animal spirit. We may however infer from the former the peculiar essences of the two latter. This way of exploring the invisible and occult parts of nature, constitutes the analytic method; but it is quite requisite to possess the experience of the senses, as well as guiding sciences, or sciences to deliver the laws and order by which nature proceeds, or by which her followers are

to proceed. This order appears to dictate, that if there are saline-urinous elements in the red blood, there ought to be similar, but more pure, simple and perfect elements in the white blood, although no eye-sight, however keen, can possibly discover them ; and again, that there ought to be similar elements, but most simple and most perfect, in the animal spirit. Otherwise there would be no derivation of one essence from the other, no distinction of one from the other. The degrees of perfection, however, in these and similar entities cannot be explored without a doctrine of forms. In the meantime, from what we have stated it is evident, how greatly the experience of the senses contributes to the discovery of nature's secrets, and that without it we cannot rise to a knowledge of the parts of the higher and simpler spheres.

## CHAPTER XVI.

*There are three orders of blood, the gross blood, the purer, and the purest.*

The red blood is properly termed the blood ; but the purer blood not so properly, because it is not red but white ; again, the purest blood is the animal spirit. The soul presides over these several fluids ; the soul, which is not blood, but the first, inmost, highest, simplest and most perfect essence of the blood, and the life of all. The red blood derives its principal essence from the minuter globules which lie in it, and therefore a volume of such globules cannot fail to be designated blood. The same applies to the animal spirits, which are involved in the purer blood. All these varieties then are denominated bloods, which is also usual in the Holy Scripture. The substantial and essential principle remains the same, while the particulars that vary the notion are mere accidents. If the blood is not denominated from its redness, gravity and crassitude, but from its inner nature, then both the one and the other of these fluids is blood ; not so if it be denominated from the before mentioned accidents. In themselves these bloods are indeed most distinct ; for they are really and actually dis-

tinguished in the body, and yet they exist simultaneously and together in the red humor; hence, for distinction's sake, they require to be signified by different names: and if in no other way, yet always by varying predicates of perfection. Thus we may say that the animal spirit is the first blood, the highest, inmost, simplest, purest, most perfect; that the white or middle blood is prior to and higher than the red, and likewise more inward, simple, pure, and perfect: but that the red blood is the last, lowest, outermost, the compound blood, the relatively gross and imperfect, the ultimate, properly the blood. The same remarks apply to the vessels of the triple blood; for the simple fibres, the compound fibres, and the blood-vessels, mutually succeed and correspond to each other in the same manner and order.

## CHAPTER XVII.

*The fabric or form of the prior or purer blood is more perfect than the fabric and form of the posterior or grosser blood.*

The form of the red blood globule is circular, for the globule is perfectly spherical, and rolls in circles in the vessels; and moreover it includes particles of an angular form. Thus the form of the globules of the red blood is the ultimate and penultimate form. But the form of the globule of the purer blood is not circular or spherical, but spiral; as indeed may be inferred from the circumstance of these globules being oval, and therefore designated\* as *plano-oval*; for the form of a spiral fluxion of parts engenders the external figure or form of an oval. Such is the case also with the cortical glands, which are at once spiral and vortical forms. But the form of the globules of the purest blood is the next higher form, or the vortical. For as the bloods themselves become simpler, so their forms become more perfect. The doctrine of forms, as well as experience, shews that such is the order, and such the ascent of perfections.

\* By Leeuwenhoek.—(Tr.)

## CHAPTER XVIII.

*The three bloods reign both conjointly and separately in the animal body.*

They reign conjointly in the red blood, for this has within it both the purer blood and the animal spirit; for which reason we have termed it the repository of the preceding fluids. Conjointly also in the purer blood, which has within it the animal spirit, and the latter, the soul. Each blood also reigns separately; namely, the animal spirit in its own fibres, the purer blood in its own, and the red blood in the vessels. All things in the organic body are thus at once separated and united; and each blood does its own work, and rules its own organism. On these conditions, and no other, can the soul form and govern the body in a just order and succession, and preside over and command it in the sphere of the veriest singulars, and universally at the same time. The more nearly conjoined then these reigning humors are in the red blood, and the more exquisitely discriminated from each other, the more perfect is the organism, and the more obedient all things are to the decisions of the soul. But as soon as ever the distinction and the union are lost and confounded, the sensation and action of the body become comparatively indistinct, indeterminate, unfelt and imperfect. For the above reasons, at every round of the circulation the red blood is resolved into the purer, and this, into the animal spirit; and then the red blood is again composed of the two latter. Thus the circle of life is carried on.

## CHAPTER XIX.

*The animal spirit acts on the blood, and the blood on the spirit, by means of the vessels and fibres; whence the alternate and reciprocal action of the muscles.*

But this proposition need only be stated here. In a subsequent chapter we shall treat of the action of the muscles.

It may be observed, however, that without the discrimination of the humors which are the agents, there could be no reciprocal action, *i.e.* no simultaneous and successive action and reaction.

## CHAPTER XX.

*The state of the red blood depends upon the state of the purer blood, and the state of the latter upon that of the spirits.*

The nature of any compound is according to the nature of that which exists substantially within it; for putting accidents out of sight, the compound derives its nature from that of the simples which it comprehends. The red blood indeed may be defiled with heterogeneous particles; but as the larger portion of it is resolved and recompounded during every round of the circulation, and its hard, or antiquated and indissoluble parts are rejected towards the liver and the gall bladder, so it is purified successively. Therefore so long as the animal spirit and the purer blood remain in their integrity, so long can any morbid state of the red blood, or of the body, be corrected, in which case nature is said to operate the cure. In this way the one flows into and influences the other, and the prior or inner sphere repairs whatever may have fallen into dilapidation in the posterior or the outer.

## CHAPTER XXI.

*Infinite changes of state happen to both the red and the purer blood.*

We shewed in the Treatise on the Spirits, that the animal spirit undergoes infinite changes of state. This mutability of the spirits, this their intrinsic nature, all passes by derivation into the state and nature of the purer blood, and all the mutability and nature of the latter passes again into the state and nature of the red blood; for the state of the one depends by continuous influx upon that of the other. Many peculiar muta-

tions and varieties both in accidents and accessories, are also induced on the purer blood, all and each of which alter the state of the red blood. There are moreover peculiar changes of state in the red blood itself, that is to say, in accidents and accessories. By accidents we mean the situation, position and connexion of the parts which enter and constitute it, consequently the order, which results in the form and quality. The accessories on the other hand are those saline-urinous and sulphurous particles which are taken into the globule to give it coherence and composition. The mutations in the accidents, or in the situation and connexion of the genuine and essential parts, depend in general upon these accessories, and their quality and quantity: hence we have the blood relatively soft, hard, hot, cold, red, pale, or green; in a word, hence the circumstance that the blood is spurious, legitimate, or various. This shews how mutability increases in compounds, and with it, inconstancy and imperfection of various kinds. Each change of state in the simpler parts which lie within the others, induces a change in the compound, though not *vice versa*; for there are proper or peculiar accidents, as well as accessories, in every composition. That the changes of state in the blood are infinite, or exceed all enumeration, may be shewn analytically and by calculation.

## CHAPTER XXII.

*The blood of one individual is never absolutely similar to the blood of another.*

It was indicated above that the soul and animal spirit of no two individuals are ever absolutely similar or equal in their whole nature and accidents: it follows that the same remark is applicable also to the blood. For the nature of the animal spirit determines that of the purer blood; and this, that of the grosser or red blood. And the latter may be varied in infinite ways besides; for the blood of one subject is softer or harder than that of another; it is heavier or lighter, hotter or colder, paler, redder, or blacker. The globules also differ in size in different persons. Instead of the saline cube or octohedron, the place

of the fulcrum may be supplied by a dodecahedron, a hexagon, or a pentagon ; which will give rise to a greater or lesser quantity of the purer globules, and to a variation in form. Instead of the urinous salts or subtle and volatile trigons, acids or more fixed salts may be inserted in the angular interstices, or elements of some other description, which will at once alter the state of the globule. The latter may be surrounded with other fragments and floating pieces of the most diverse kinds ; and also with chyle and serum equally diverse ; not to mention a number of other varieties which it would be tedious to particularize. The existence of these diversities in the different orders of blood, is proved by the common law, that there are as many different bodies, different actions, different dispositions, different minds, inclinations and temperaments, as there are heads and subjects ; which induces me to believe, that not only is the blood of one individual not absolutely similar to that of another, but that it is never quite the same in the same subject at any two moments ; for the mind, and the animus which depends upon the state of the animal spirits, are perpetually varying ; and I further believe, that no two globules of blood are ever absolutely similar. I need not now mention the blood of land animals, birds, or fishes, in which the globules are differently formed, some being oval, surrounded with a thin surface or crust, white, naturally cold, &c., &c.

## CHAPTER XXIII.

*The red blood is the seminary of all the humors of the body.*

“The humors of the body are the following : chyle, milk, blood, serum, lymph, animal spirit, saliva, the mucus of the mouth, bile—the liquor of the pancreas, stomach, intestines, oesophagus, brain, eyes, thorax, pericardium, abdomen, tunica vaginalis testis,—semen, the liquid of the prostate glands, the mucus of the nose, tonsils, joints, urethra, uterus, vagina, and Fallopian tubes,—the humor of the ova, and that in which the foetus swims, cerumen of the ears, urine, and sweat,”\* and a

\* A citation from Heister, *Comp. Anat.*, n. 34.—(Tr.)

number of others requiring to be specifically discriminated. It is clear from the very structure of the glands, in which these humors are prepared and elaborated for every use, that the red blood gives birth to nearly all of them. Indeed the glands are composed of nothing but vessels and fibres. The red blood and the purer enter them with their vessels, and the spirit, with its fibres; and then the humor issues forth reconstituted from the glands. This is conspicuously seen in the milk, semen, and saliva. In each of its spherules the blood comprehends mere principles and elements; consequently in potency and virtue it possesses all that is producible in the world by simple principles, elements and substances; in one word, all that is possible. The globule which holds within it these elements and determined unities, and this, so subordinated and coördinated, that it can be readily resolved into them one by one, cannot fail to procreate all species of humors in the universe; and this it actually does, because it is resolved or disintegrated during every round of the circulation. Hence in the nature of things no compound entity can possibly be more perfect than the blood. From this view of the bodily constitution of the blood, it follows that each blood-globule is a kind of microcosm, or contains in act all the series which preceded it, and in potency all which follow it; in potency therefore a whole human race, for the seed arises from the blood.

## **THE ANIMAL SPIRIT.**



## THE ANIMAL SPIRIT.

### CHAPTER I.

*The animal spirit is that most pure humor which flows through the medullary fibres of the brain and the nervous fibres of the body.*

This is the general opinion of the learned, as well as our own, and is confirmed by all the phenomena of the case. The existence of the animal spirits is unquestioned, as also that they are conceived in the brain, and sent down through its fibres into the fibres of the body, and ultimately into the motive fibres of the muscles. For without the ministration of the spirits, actions corresponding to the decisions of the soul could never be performed, nor could sensations be conveyed to the soul; and therefore when their descent is impeded, either at the fountain-head, which is the brain, or in the first streams, that is to say, in the medullary fibres, or in the nerves themselves, whether the impediment be the result of compression, division, erosion, or obstruction, the effect instantaneously ceases. Moreover, under the microscope, the fibres are presented as round and hollow cylinders, as if designed to convey a fluid; besides which, without they had a fluid in them, nothing whatever in the animal body would have either origin, progress, order, law, form, or life. The nature, however, of the medullary fibre, and also of the nervous, and the mode in which the latter is connected with the former, will be shewn in the Treatise on the Fibres. Now since it is indubitable that a species of fluid, or a very pure essence, permeates the fibres, the question is, how to name it. In general it is called the animal spirit, and likened to a most

pure honor, of such endowment, fluidity and perfection, as to glance through its own invisible fibres, comparatively as the blood runs through the blood-vessels.

## CHAPTER II.

*The animal spirit is conceived and prepared in the cortical gland, and flows out therefrom into the fibres.*

It follows by the very connexion of causes, that the animal spirit cannot be conceived and excluded anywhere but in the cortical gland; which latter is the beginning and head of its own fibre, and the little brain of the same. If then the fibre springs from the gland, and the animal spirit is the spirit of the fibre, the fountain and womb of the spirits must be in the gland. The cortical gland then may deservedly be styled the most perfect model laboratory and chemical organ in the animal kingdom. Moreover according to anatomists this gland contains a little cavity, a simple chamber or ventricle, and has within its structure a pure medullary and cortical substance, whereby it is the most perfect exemplar of the grand brain. There is therefore no doubt that the spirit may be prepared in it. The means, however, and the art, whereby this preparation is effected, and the nature of the spirit produced,—these are the main tasks and difficulties of our exploration. The most learned anatomists, as well as the best authorities on physics, agree with us so far, and therefore ascribe a glandular character and construction to the cortex of the brain. For all the animal humors are elaborated in glands; and the finer and simpler the gland, the purer the humor; which in the highest case should be called not simply a humor, but the better and nobler essence of the humors of the body. Therefore it is designated by the peculiar and appropriate title of the animal spirits.

## CHAPTER III.

*The quality of the animal spirit may be known from the quality of the fibre that it permeates, and vice versa.*

Such is the correspondence which prevails throughout the animal kingdom, that the nature of one thing may be known from that of another; and this mode of inference is particularly available for the fluids, which permeate the fibres, vessels and ducts. The fibre is formed with a view to its fluid or spirit; the vessels, arterial and venous, are formed with a view to theirs, that is to say, to the blood; and the ducts are formed with a view to the other humors. All these parts from the earliest infancy are inaugurated into this conformity. So mutually are they accommodated to each other, the contained fluid to the containing fibre, or the containing tunic of the fibre, that they make conjointly one cause and one determination. But I forbear this train of argument. Certain it is that the anatomy of the fibre shews the possible character of the spirituous humor; but its internal nature we shall now investigate a little more deeply.

## CHAPTER IV.

*The animal spirit is the intermediate essence between the soul and the body; hence it is the mediatorial substance which provides for the communication of operations between the two.*

This completely coincides with the received opinion of the learned on the essence of the animal spirits. There must be a middle or mediatorial substance to enable the soul to operate on the body. It would be against nature, and contrary to the order of things, if, notwithstanding the provision of a number of intermediate forms, the first form were to pass to and influence the last immediately. The soul is the first, highest, inmost, simplest, and most perfect essence and substance. The body is the last, lowest, most external, and most thoroughly compound

and imperfect substance. For the first then to operate upon the last, there must be a middle or intermediate that takes its nature from both. In other words, for the most perfect to act upon the imperfect, there must be a link of intercession, to take something from both the perfection of the one and the imperfection of the other. The animal spirit is such a link; and therefore where the animal spirit is wanting, the soul is powerless to govern the body in correspondence to its own operations. This is plain from actual effects and phenomena; the experimental demonstrations on the subject being rather super-abundant than deficient. It will, however, be impossible to explain to ordinary comprehension how the animal spirit plays the part of a mediator between the soul and the body, unless we are previously acquainted with the definition of, and the distinction between, the soul and the body. We have already defined the soul, as well as the body. But to enable us to perceive the mediation here alluded to, we ought to know what fluids and fibres they are which determine the form and structure of the body. The first, the principal, and the proper essence and substance of the kingdom, is that which is termed the soul, or the souls'; the last is the red blood. The blood-vessels produce the ultimate form, *i.e.*, the form of the body. The organic structures are called into existence, fashioned and constructed, by mere vessels, and by mere fibres. The animal spirit is therefore the intermediate essence between the soul and the red blood. By this alone can the soul act upon the blood, that is to say, upon the body, which is determined by, and constructed of, fibres and blood-vessels.

## CHAPTER V.

*The animal spirit partakes of the essence of the soul, and of the essence of the body; that is to say, it is both spiritual and material.*

The essence that is intermediate or mediatorial between the soul and the body, must take its nature from both. The soul is spiritual; the body is material. It follows that this animal

humor is both spiritual and material. Were it otherwise, the spiritual could never operate upon the material, or *vice versd.* But how natures so different can be united in one subject, requires to be shewn ; although that they are united, is clear from the body, including its viscera, and motory and sensory organs, all of which are animated, notwithstanding they are material.

## CHAPTER VI.

*The animal spirit is identical with the purer, middle, and white blood.\**

When the red blood globule is divided, disintegrated, or dissolved, other globules are set free, which are not red but white ; and indeed according to the often repeated and clear experience of Leeuwenhoek, one globule of red blood gives birth under the above circumstances to six lesser globules of white blood or white humor. Not only have the lesser globules been seen, but their peculiar mode of cohesion, and also of separation, has actually been described, as well as the fact of these lesser globules sundering into others still smaller. To this point at the present day has our vision penetrated, so that we can no longer doubt of the existence of the lesser globules. The volume or humor consisting of them we term the white and middle blood, inasmuch as it arises immediately when the red blood globule is ruptured. This issue of pellucid blood must evidently spring from a source of its own, inasmuch as it is divisible and to the last degree flexible, and therefore cannot but consist of some very pure essence.

The identity between this purer blood and the animal spirit, we deduce from the circumstance of its permeating the minutest capillaries ; of its winding its way into the cortical glands, from which it is derived into the fibres, and so accomplishes its circle ; from its being of a sufficiently soft nature, perfectly yielding, also divisible, and capable of accommodating itself to

\* [Note by the Author.] This requires alteration, for the spirit is distinct from the purer blood.

every fibre ; furthermore from the possibility of its being the intermediate between the soul and the red blood. The latter, that is to say, each globule of it, is in a manner the repository and complex of all the parts or forms antecedent to it in existence, and even derives its principal essence from the soul, being preëminently animate. If then the red blood has its prior essence from this pellucid blood, the latter would seem to have its prior essence from the soul or the primary substance. For it must have in it some deeper ground, something relatively excellent and prior, also higher, more intimate, simple, and perfect. And when phenomena are scanned more nearly, or seen in their causes, they confirm the same position with one accord.

## CHAPTER VII.

*As the animal spirit is conceived and prepared in the cortical glands, it follows that the spiritual and material principles meet in it.*

To the end that the marriage of the soul and the body may have issue, and that the progeny may inherit the nature of both the parents, the latter must of necessity meet and combine in that chemical organ where the spirit is prepared. The organic form of the cortical gland, as specified above, contains a minute chamber or ventricle ; also a medullary substance of the purest kind ; and this, two-fold, or vascular and fibrous ; and moreover a simple cortical substance, which is the origin and beginning of simple fibres. By comparing the cortical gland in these particulars with the brain, which itself is a gland and a great chemical laboratory, we may to a certain extent illustrate the generation of the animal spirits ; or at all events so far establish it, that when the causes of the phenomena coincide, the above points will go a long way to persuade us.

## CHAPTER VIII.

*The simple fibre arising from its own simple cortex, pours into the minute cavity or chamber of the gland, a substance of the purest kind, which is conceived and born in the simple cortex, i. e., the substance of the soul. And the finest vessels, which constitute the other portion of this simple or vascular medulla, supply a lymph or serum of the purest nature, capable of containing the purer corpuscles, or the first sulphureo-saline elements. From the marriage of these two substances the animal spirit is born.*

To understand these positions, it will be necessary to make ourselves familiar with the construction of the cortical gland. We have given a description of it above, where we have shewn, that the simple substance termed the soul, is conceived and born by a transcendent process in the simple cortex; and that the simple fibres are its channels of determination, or the rays of its intellectual light. If then this first substance is conceived in the simple cortex, it must be carried along its fibres wherever the latter are determined. Now that a very large part of the simple fibres terminates in the extremely minute cavity of the gland, is rendered highly probable by the analogy of the brain itself. Thus the medullary fibres of the brain, which commence their course from the cortical glands, end for the most part in the lateral ventricles,\* where they exhale and de-

\* This position of Swedenborg appears to be borne out by modern research, although his deduction has not yet been drawn by others. It is now generally admitted that each nervous fibre, including also the medullary fibres of the brain, proceeds singly, i. e., without real anastomosis, from its origin to its termination. But if we regard the whole brain as a cylinder, and compare its calibre with that of all the nerves which issue from it, and of the spinal marrow, the proportion will probably be as more than 100 to 1. A vast body of fibres must then terminate in the brain itself; and where therein but in the ventricles, the walls, sides, or ends of which consist for the most part of medullary substance? This consideration throws important experimental light on the existence of the animal spirit, as well as indeed upon the functions of the brain generally.—(Tr.)

posit their spirituous essence. The portion of fibres which does not terminate there, runs towards the medulla oblongata, to give origin to the nerves. The same appears to be the case with the simple fibres in the cortical gland, that most minute brain. Moreover the latter is a considerable mass relatively to the fibre to which it gives birth, which shews that it is not all spent upon the fibre. If then so large a portion of the fibre terminates in the little chamber of the gland, it follows that the very substance that is born in the simple cortex, must be derived to that chamber, and be poured thereinto; all indeed but the part that goes to form the medullary fibre.

The analogy of the brain shews likewise that the purest elements and sulphureo-saline principles of the serum, are conveyed into the same chamber by their own proper vessels. The medullary substance of the brain is twofold, viz., vascular and fibrous. In the lateral ventricles moreover we have the choroid plexuses, which consist entirely of vessels, or of interlacements and meshes of little arteries. From these a quantity of serum exudes into the ventricles, which mingled with the spirituous essence of the fibres, prepares the animal spirit to pass with facility into the red blood. A similar mode of construction and function appears to obtain in the cortical gland. The vascular substance that ramifies through the gland, terminates of necessity in the cavity thereof; for the beginning of the fibres is coincident with the end of the arteries. If then both the medullary substances, the vascular as well as the fibrous, terminate in the simple ventricle, chamber or cavity of the gland; and if the fibrous substance carries the purest animal essence, or the substance of the soul, and the other or medullary carries the sulphureo-saline or ethereal principles and elements, it follows that the contents of each are married in the little cavity, to give birth to that most noble offspring, the animal spirit, which partakes at once of a spiritual and a material essence.

But it will be asked where the subtle vessels come from which are inserted into the gland. Now, according to the idea we have suggested of the cortical gland, not only does the arterial vessel pass into the body of the gland with the purer blood, but the little coat of the same vessel also passes thither with the minute stamina or threads of which it is composed.

The threads dividing and ramifying through the gland, constitute the second or vascular substance of its medullary portion.

With regard to the origin of the vascular stamina, these, inasmuch as they pass into the gland, cannot arise immediately from its simple fibres, but must accompany the carotid arteries from the kingdom of the body: for the innermost tunic of the arteries, their membranous and fibrous tunic, is what ultimately remains, and enters the cortical gland. This innermost tunic of the arteries arises from what we term the corporeal fibres. For the truth is that all over the circumference of the body, underneath the cuticle, there are planted an infinity of glands with little mouths and efferent ducts, which exhale the subtlest effluvia of the body, and also imbibe similar but fresh effluvia from the bosom of the atmospheres and of the ether. Similar glandular congeries are also found in the stomach, lungs, and other parts of the system. From these subcutaneous or miliary glands, as well as others, proceed fine ducts, as it were corporeal fibres,\* or fibres aspiring to the character of vessels, which weave the innermost coat of the arteries, and at last terminate in the cortical glands, the vascular substance of which they generate. That such is the production of the stamina which enter the cortical gland, is proved by the Sanctorian perspiration; by various morbid, pestilential and poisonous contagions; by the soothing and enlivening effects of spring breezes and exhalations; by the long continuance of life without either food or drink which is usual with certain animals especially; by the infinite pulmonary pipes of insects, which pervade all points of their viscera, nerves, and vessels, even to the innermost parts of the brain and spinal marrow; by the wonderful communication of the glands with the atmospheres, as noticed by Hippocrates; also by the ocean of effluvia surrounding us in the air and the ether. It may be inferred from the origin of these fibres or vascular stamina, that they carry no other than the elemental or material fluid, which in fact they imbibe from the atmospheres and the purest aliments. This then, married to the purest essence in the

\* In the language of Swedenborg, the fibres proper belong to the brain, the vessels, to the body; but the fibres which arise in the skin, as the ultimate produce of the brain in the body, are termed corporeal or bodily fibres, and said to be *vasculorum emule*.—(Tr.)

minute pore or cavity of the cortical gland, produces the animal spirit here treated of.

And here we might shew by an infinity of experimental proofs, that these vessels imbibe a most pure serum of the nature above described, and transmit it towards the cortex; and that this serum is impregnated with sulphureo-saline principles and elements; also that these elements are so formed, as to fit and adapt themselves to that pure essence; we might, we repeat, shew these points if this were the place to treat of the forms of these parts. The subject however is one that demands a separate treatise, which indeed we have bestowed upon it, but we must not venture to exhibit it here, as it would cause too long a digression.

#### CHAPTER IX.

*There is also a perpetual circulation of the animal spirits from the cortical glands, through the medullary fibres of the brain and the nervous fibres of the body, into the blood vessels, and from the blood vessels or arteries back into the cortical glands, and so again into the fibres.*

Besides the living source and spring of the animal spirits, there is also their perpetual circulation, which the most instructed of the learned have not only suspected to exist, but even appear to think they have rendered visible by their microscopes. The arterial vessel runs up to the cortical gland on the one hand, the medullary fibre issues from it on the other: in the gland itself there is a cavity, which like the chamber of a heart draws in the advancing blood, and sends it out into the fibre as its own little artery. Thus there is a perpetual circulation from the arterial vessels through the middle of the glands into the fibres. It is further observed, that the red blood never approaches the gland too near, so as to run into it, but only the white blood does this, that is to say, the red blood after it has undergone resolution, in which case it becomes identical with the animal spirit. The animation or alternate expansion and constriction of the glands, is the means whereby this blood is

attracted and expelled. Were it not for this circulation, the system of the fibres would never be accurately filled with the due supply of spirits, an immense abundance of which is momentarily required to enable the sensory and motory organs, and the several viscera, to perform their offices agreeably to the commands of the soul. The animal functions one and all cease in an instant, the machinery labors, and death usurps it, as soon as ever this circulation is arrested, either in the vessels, in the fibres, or in the glands. The purer blood which makes this circuit, brings also similar elements for recruiting the animal spirit.

## CHAPTER X.

*The soul apart from the animal spirit could never have constructed the simpler and middle organic forms of the body.*

By the middle and simpler organic forms of the body, we mean those that the medullary fibre of the brain and the nervous fibre of the body are the only elements to enter and construct. Such for instance are the primitive cerebrum and cerebellum, the medulla oblongata and spinal marrow including all their delicate members and parts, the initiaments of the viscera, and also of the heart and the motory and sensory organs; in a word, all parts whatever to which the compound fibre runs. The whole of these in the primordial stages of formation, are engendered of the fibres alone, and not of the blood-vessels; according to the observations of Malpighi and others. The simple fibre apart from the compound which it forms by circumvolution, gives birth to no organic products; as neither does the soul, apart from the animal spirit, produce any issue excepting the simple cortex, which is the first of organic forms, and the nearest to the soul. Everything then that is organic, partakes of the simple and of the compound fibre, or of the spiritual and the material.

## CHAPTER XI.

*The soul apart from the animal spirit could never produce the heart; or the vessels, either arterial, or venous; or the red blood; or consequently the ultimate organic form of the body.*

According to the theorems of our Treatise on the Fibre, it follows, that there is nothing substantial in the body but the soul and its fibre; *i.e.*, the simple fibre. The reason of this is, that the simple fibres by their determination form the medullary and nervous fibre; this in its turn, the blood-vessels, and these again in conjunction with the fibres form the glands, from which proceed ducts and emissary canals, as it were new fibres or new vessels. Of these then, namely, the fibres, vessels and ducts, the whole system of the body is constructed. Thus the blood-vessels cannot exist without the compound fibres, nor can the latter play the part of fibres without the animal spirit. So when the soul is about to inform or create its body, it has first to produce an intermediate spirit. Moreover the red blood itself has no existence without the same spirit, for this spirit is its principal essence. Accordingly when the red blood-globule is dissolved, it is resolved, according to our proposition, into the purer, middle or white blood, in a word, into the animal spirit.

## CHAPTER XII.

*Without the animal spirit the soul could determine nothing into action, and could do nothing in the body.*

The action of the body depends on the nervous fibres and blood-vessels, which jointly construct the motive fibres. Both fibre and blood-vessel, that is to say, both the animal spirit and the red blood, enter into every muscle; according to the plain shewing of experience. The spirit and the blood are clearly the efficient causes of muscular action; this is proved by convulsions, tetanus, spasms, by paralytic, apoplectic, and epi-

leptic cases ; also by the circumstance that the action of the muscles is lost at once when the fibre or blood-vessel is divided, compressed, or obstructed. Therefore in order that action may proceed from the will, and the will which regards such action, from the choice of the mind, both the spirit and the blood are absolutely necessary. The spirit is the middle substance which is under the command of the soul, while the blood is the ultimate substance, whose duty it is to obey. The anatomy of the brain however teaches the manner in which the soul determines its will into action ; shewing in fact that this takes place by the constriction and expansion of the cortical glands, whereby the animal spirit is expressed into the fibres, and at length into the motive fibres of the body, just as the blood is expressed from the heart into the arteries ; and constantly the blood reacts, and recovers its state ; and in this way action becomes reciprocal.

## CHAPTER XIII.

*Without the animal spirit, the soul could feel none of the changes that happen to the body.*

All the organs of the senses are provided with particular nerves. The eye is furnished with the optic nerves ; the ear with the auditory nerves of the seventh pair ; the tongue, with the gustatory nerves of the fifth and ninth pairs ; the nares with the olfactory nerves, which lie like teats on the front of the cerebrum. When these nerves are either divided, compressed, obstructed, or their action otherwise weakened, the particular sense to which they minister is instantly deprived of its sharpness in exact proportion to the extent of the violence or lesion. This is a piece of simple experience. The nerves, however, consist of medullary fibres, that is to say, of the fibres that arise from the cortical glands ; consequently there can be no actual sensation without the fluid and spirit of those fibres. And indeed sensations cannot ascend immediately to the soul ; they cannot rise thither without an internuncio like the animal spirit.

## CHAPTER XIV.

*The nature of the action and sensation, and even of the imagination and thought in an individual, are correspondent to the nature of the animal spirit and the circulation thereof in the body.*

This is a consequence of the preceding theorems. If the soul cannot act in the body, or feel in the organs, without the animal spirit, it follows that the action and the sensation are correspondent and proportional to the animal spirit which produces them both. This is very manifest in drunkards, and in insane, idiotic and other subjects whose animal spirits are either contaminated, or else circulate irregularly, or too small or too large a supply of them is sent to the sensory and motory organs. The very speech, gait, countenance, even the eyes of such persons, clearly proclaim the state of the spirits, and shew that they are excited by various substances and the goads of alcohol; from the cross action of which disorder invades the speech and actions. The subject of the imagination, however, whose ideas are changes of state in the cortical gland, and of thought, the rational ideas whereof are similar changes of state occurring to the simple cortex—these subjects will be considered in the sequel. Meanwhile the nature of the imagination determines that of the sensation and action, which latter descend from imagination as their proximate cause.

## CHAPTER XV.

*The animal spirit makes us both spiritual and corporeal.*

By the definition of the animal spirits, they partake both of the soul and the body. Moreover the nature of the spirit, including its circulation, determines the nature of action, sensation, imagination and thought. By consequence from the nature and quality of these spirits we derive the fact, that we are spiritual, and that we are corporeal or material. The more

of the soul there is in the spirits, the more spiritual we are, and *vice versa*. Hence it appears that those who eat gross and impure food, and sink their minds in the earthly sphere, have an impure animal spirit, impregnated with material forms; which indeed experience shews to be the case.

## CHAPTER XVI.

*In the human microcosm, all that is above the animal spirit constitutes the inner man; and all that is below it, the outer.*

The soul is above the animal spirit; the red blood and the still grosser humors are beneath. The soul is spiritual, and the soul's operation, whereby it regards the body, is celestial.\* The blood on the other hand, as it abounds in saline elements, is for the most part corporeal. Both these natures, however, are contained in the spirit, which is equally near to both. The higher essence is also simpler, prior, more perfect, and at the same time more internal; the lower is relatively compound, posterior, imperfect, and external. Therefore the inner man is above the animal spirit, and more perfect than it; and the outer man is below it, or more imperfect. But the mode whereby the internal or spiritual operates upon the external or corporeal, will be explained in our Treatise on the Intercourse between the Soul and the Body.

\* It is to be observed, that Swedenborg does not here use the terms *spiritual* and *celestial* in the sense in which they occur in his Theological Works; but with the signification which they bear in his *Animal Kingdom*, Vol. I., p. 126, where the perpetual vortical form is designated *celestial*, and the perpetual celestial, *spiritual*; the latter being therefore above the former.—(Tr.)

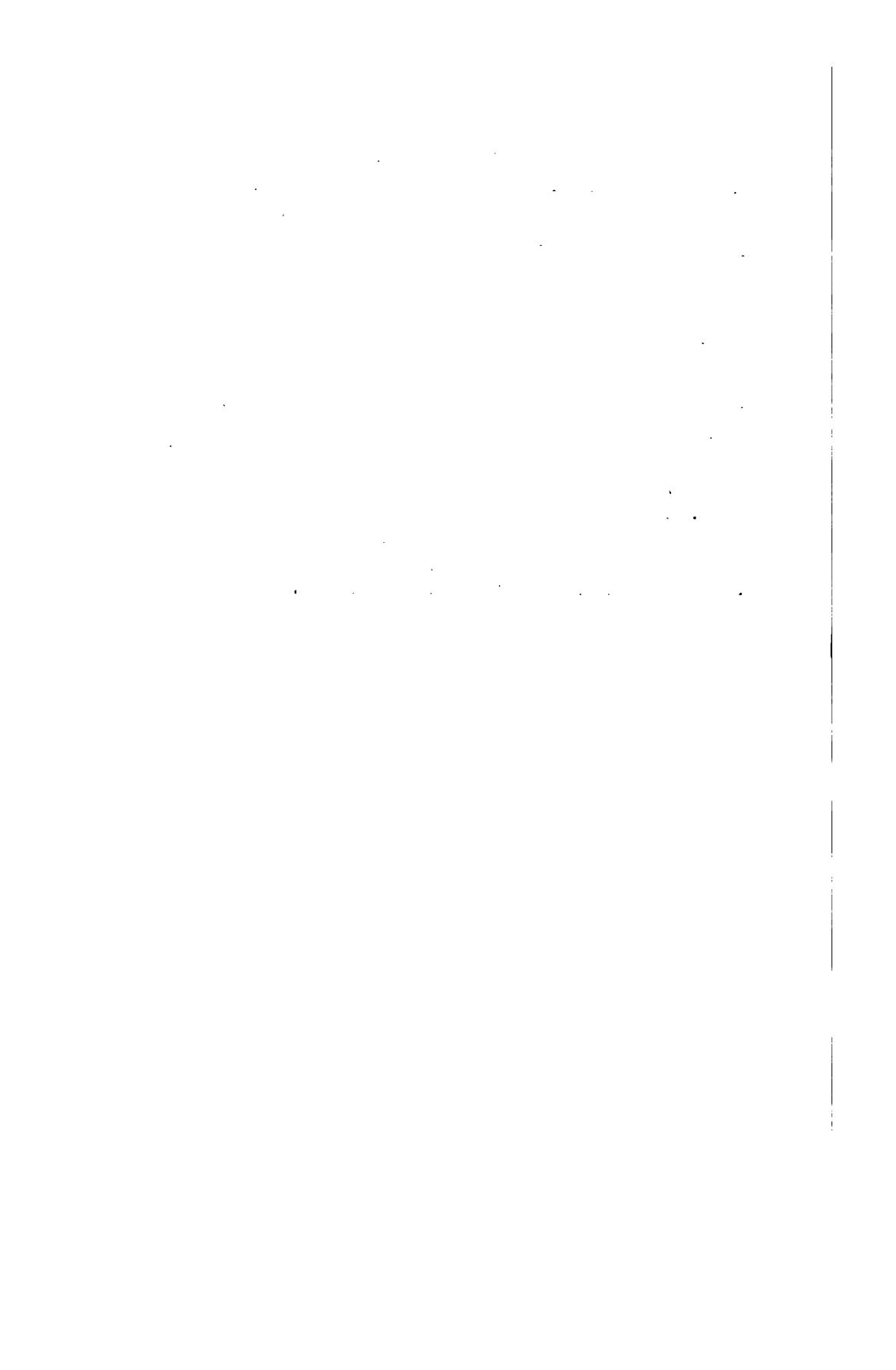
## CHAPTER XVII.

*The animal spirit is never absolutely similar in any two individuals; on the contrary it is different in all the subjects of human society, and always different at different times in one and the same person.*

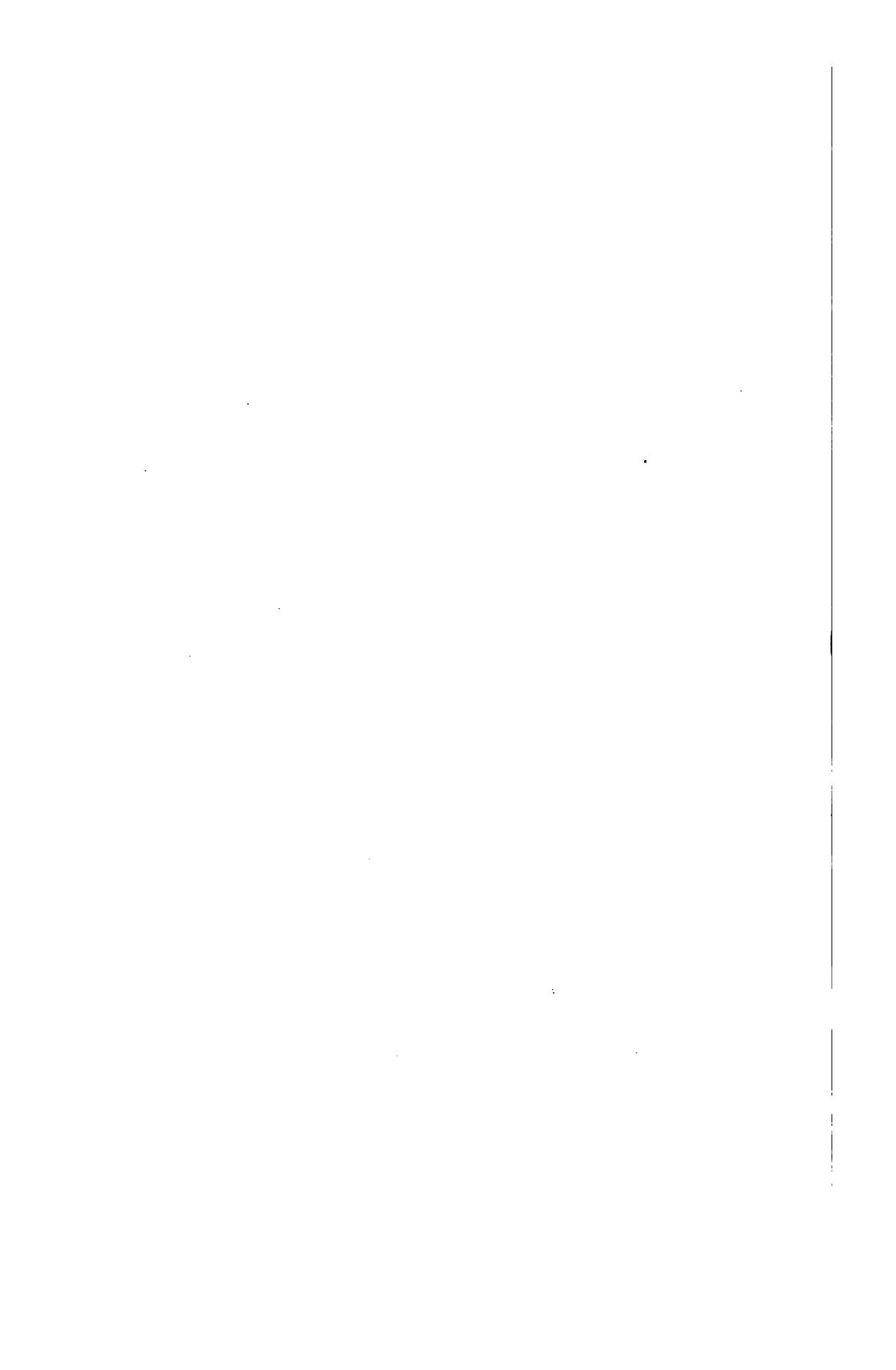
Throughout the whole of human society the state of no two souls is ever absolutely similar; and the same remark applies to the red blood as to the soul. It follows that the animal spirit can never be absolutely similar in any two cases. For the animal spirit is the middle or mediatorial essence, whereinto the soul flows from above, and the blood from below; as already mentioned. Moreover the *animus* depends on the nature of the spirits; wherefore there are as many varieties of the one as of the other. The truth of this is established by experience. We never meet with the same face, or the same speech, actions, or any other conditions, in any two persons, but the grounds of distinction are infinite. And as these forms cannot be engendered without the ministration of the spirits, and as in their production and construction they follow the quality, quantity and circulation of the latter, so it is evident that the spirit can never be absolutely equal or alike in any two instances. Consider also that the perfection of nature, the nature of nature, consists in the fact, that one thing is never identical with another in the whole range of its essentials and accidents. As for quality, the spirits are impregnated with vast numbers of sulphureo-saline elements, and which are more abundant in some subjects than others; also with diverse other species of elements that they imbibe from the bosom of the atmosphere and from the inner parts of the food. Thus the causes of variety in this respect are infinite. The cortical gland also, which is the organ for the preparation of the spirits, differs in different subjects; preparing the spirit differently in different subjects; admitting thereinto, and mingling in the composition, a greater share of one nature in one case; a less in another. The quantity also is various in every instance, as the spirit is elaborated and expended according to the requirements, uses, and necessities of

the body. It differs in fact in every case. Likewise the circulation of the spirits, which depends altogether upon natural necessity and rational use. For the cortical gland expands and contracts continually and variously ; consequently such a quantity of spirit is attracted from the vessels and expelled through the fibres, as the body including the sensory and motory organs requires. Thus the state of the circulation varies every moment in every man. And this is completely confirmed by the affections and ailments of the animus, and by the diseases of the body.

N.B. The purer blood is a different thing from the animal spirit. The former is the fluid that arises out of the resolution or disintegration of the red blood ; but the latter consists of the spirits, with volatile particles, comprising the first saline and sulphureous elements, inserted between them.



**SENSATION OR THE PASSION OF THE BODY.**



## SENSATION OR THE PASSION OF THE BODY.

### CHAPTER I.

*Sensations are external and internal.*

The external or bodily senses are those of touch, taste, smell, hearing, and sight. Internal sensation consists in the perception or apperception of the objects that flow in from the organs of the external senses. Intimate sensation is identical with intellection or understanding, for the objects that are felt and perceived are also to be rationally understood. The innermost of all, or the principle of sensations, is the sense of the soul, and is identical with pure intellection or intelligence; for the endowments of sensation, perception, and intelligence, are due to the soul alone. As sensations are external and internal, so are their organs also. The organ of touch is coextensive with the circumference of the body. The tongue is the organ of taste. The membrane lining the nares and nasal cavities is the organ of smell. The ear is the organ of hearing, and the eye of sight. The cortical cerebrum, or the cortical substance of the cerebrum, is the organ of perception. But the organ of intellection or intimate sensation is that very pure or simple cortex contained in each cortical gland. These organs, the internal as well as the external, constitute sensoria, and of all the external the cerebrum is the common sensorium.

## CHAPTER II.

*External sensations communicate with internal, or the external sensories with the more internal and with the inmost, by means of the fibres.*

The most slender knowledge of anatomy is sufficient to shew, that internal sensations effect their communication with external by means of the fibres. A fibre runs up from every point of the skin towards the spinal marrow, or the medulla oblongata; and this is why these fibres are termed sensorial, to distinguish them from the motory fibres. A fibre of the ninth, eighth, and fifth pairs of cerebral nerves runs from every point of the tongue. A fibre runs from the nares through the cribriform plate to the mammillary processes, which are affixed like bottles to the anterior part of the cerebrum. A fibre both of the portio dura and portio mollis of the seventh pair runs from the ear. The great optic nerve proceeds from the eye. These fibres run on until they reach their principles or sources, namely, the cortical glands. Internal sense resides of a certainty in these principles or glands, and is dependent on their changes of state. Simple fibres again are put forth by this gland to a certain still purer cortex, which we term the simple cortex, and on this hangs our intellection of all objects apperceived and felt. Thus by means of the fibres there is a continual communication between external sensations and internal. For this reason it is, that the senses languish and die away as soon as ever the intermediating nerve is either divided, strained, or obstructed; as we know to be the case from innumerable facts occurring in disease.

## CHAPTER III.

*No sensation is possible without a convenient organic substance.*

There can be no sight without an eye, no hearing without an ear, no taste without a tongue, no smell without a pituitary membrane. And as the external senses can have no existence without a suitable organic substance, in short, without organs,

so neither can the internal senses. The cortical gland is the organic substance of perception, and the simple cortex is the organ of intellection; as indicated above. It is absolutely repugnant to nature that a sensitive or intellectual principle should exist at all without a corresponding substance, inasmuch as sensations are but forces and modifications, which proceed from substances in action. Thus the soul is the only sentient and intelligent substance in the body.

#### CHAPTER IV.

*The nature of the sensation is as that of the organic substance; and vice versâ.*

The nature of the hearing determines the character of the ear; and the nature of sight that of the eye; and *vice versâ*, the nature of the ear determines the character of the hearing, and of the eye, that of the sight. The same remark applies in other cases. Thus in the inner sphere, the nature of the perception or imagination determines that of the cortical gland, which may be termed the internal eye or eyelet; and again, the nature of the intellection determines that of the simple cortex. And *vice versâ*. Wherefore all sensation corresponds and coincides with the state of its particular sensorium. If sensation belongs to an organ, it must necessarily exist according to the state of that organ.

#### CHAPTER V.

*The nature of the external sensation is determined by the nature of the communication with the internal sensorium.*

It is not the organ of external sensation that feels, but only the soul, for the soul understands what the sensation is. Consequently the organ of external sense is but the instrument for receiving the first advances and touch of objects, or the forces reaching the system. Thus it is that when the eye is closed, and the ear reposes, as during sleep, we still seem to see and hear; and that when the power of perceiving is lost in the brain, the external organs are at once deprived of sensation, though

not *vice versa*. This causes our sensations to become either dull, acute, obscure, or distinct. It is evident from the diseases of the head, that sense varies with the state of the brain. Thus the fibre is either relaxed, as in sleep, or tightened and stretched, and raised and rendered distinct for sensation, as in the waking state; or is inflamed and heated, or else affected in some other way. From moment to moment the sense varies, with the state superinduced upon the fibres, or to which the fibres are reduced.

#### CHAPTER VI.

*The form of the sensation is as the form of the organ.*

If the organ be the substance, and the sensation the modification, and if no sensation is possible without an organic form, then it follows that the substantial form, namely, of the sensuum, must coincide with the form of the modification or sensation. Form may be predicated both of substance, and of forces and modifications. Form is constituted of essential determinations, which determinations are inconceivable apart from the idea of the coexistence or fluxion of individual things. If the latter are set in action, a form of modification is produced, which cannot fail to be similar to the form of the substances with their determinate fluxion. Therefore sight is as the form of the eye; hearing is as the form of the ear; perception and imagination are as the form of the cortical gland; and so forth. When the organ therefore alters, the sense resulting from it alters conformably. It would however be tedious to enquire into the peculiar form of each organ, and of the sensation resulting from it. The form of the eye and of sight is more perfect than that of the ear and of hearing. The form of the cortical gland, or the internal sight, is more perfect than the form of the eye, or the external sight. Thus the perfection of organic forms grows and rises by degrees all the way to the soul, which is the forms of forms in its own particular body, the informing principle of all its other forms. The more perfect forms are otherwise regarded as superior, prior, more simple, and more internal.

## CHAPTER VII.

*The internal sensation can exist and live without the external, but not vice versa.*

So long as the brain is uninjured, internal sensation, comprising perception and intellection, or imagination and thought, remains in its vigour, however the organs of the external senses may fail. The deaf and the blind can still reason and think. But as soon as the general sensorium or the brain is attacked, the organs are deprived of the faculty of feeling. The latter therefore depend upon the former, and not *vice versa*. Hence it follows that:—

## CHAPTER VIII.

*It is the soul alone which feels, perceives and understands.*

The soul is the pure intelligence and life of the body; the proper centre to which all the deeds that are done at the circumference are referred. The organic substances, however, or sensations, are subordinated to it. The first sensation after the soul is rational intellection, intellect or understanding, which is a mixed intelligence. Next under this comes perception; and beneath this again those five sentient powers mentioned above, viz., sight, hearing, taste, smell, and touch; which are the outermost substances or sensations, and proper to the body, although the distance of all from the soul is not alike, but one is nearer to it than another. Thus the soul is only accessible by degrees, and must be approached by a peculiar ladder. If any middle sensation is weakened or destroyed, the approach to the soul is to that extent hindered or cut off; though all the time the soul remains in its own centre and its own intelligence, without having any communication with the body. For example, hearing is not possible apart from a particular internal sight almost like eye-sight; the latter again is impossible apart from the intimate sight which constitutes thought; which in its turn, being a mixed intelligence, is impossible without a pure intelli-

gence : a mixed intelligence necessarily implies the existence of a pure intelligence above it. The consequence is, that there can be no sensation without the soul, which is the only part in the body that feels, as it is the only part that purely understands what is felt.

## CHAPTER IX.

*All sensation, both external and internal, is a passion; hence during sensation the soul is passive.*

Before the eye can see, the object to be apprehended by sight, the representations and appearances, the variously combined colors and modifications of shade and light, must necessarily influence or flow into it. For the ear to hear, necessarily the sound must impinge on the tympanum and fenestæ. For the tongue to taste, sharp-pointed, saline and other particles must be provided, to strike the papillæ of the organ. Similar conditions are required in order for the nares to smell. All sense then takes place by touch ; the touch being subtler, and merely involving forces and the forms of forces in the ear and eye, but comparatively heavy and gross in the tongue and nose ; and heaviest and grossest of all in the skin and membranes, whose sense constitutes touch proper. There is then no sensation apart from touch, but sensation is produced in adaptation to the whole form of touch and tacitile objects : therefore it is not action but passion. The inner sensation, or first perception, is also a passion, but comparatively perfect and pure ; for the internal sensorium perceives nothing but what comes from the external sensoria ; and perceives them in such wise as the images and ideas flow in. The same is the case with intellection, which is intimate sensation, and depends upon perception as perception depends upon sensation. By this scale we advance to the soul, which alone feels because it alone understands. Hence the soul is passive during its feeling, or in its sense ; and this is why it is delighted with the harmonies of things, and pained by their discords.

## CHAPTER X.

*The modifications of the air and ether in the world correspond to hearing and sight in the animated body: and these modifications live, and become sensations, the instant they come in contact with a sensorial organ conformable to them.*

As are the modifications of the air, such are the modifications, *i.e.*, the tones, sounds or harmonies, of the ear. And as are the modifications of the ether, such are the images of sight. Modifications extraneous to the animate body are inanimate and dead, but as soon as they touch the body, they are transformed into sensations. This is why sensations are commonly called modifications, and organs are said to undergo modification. When modifications approach the very threshold of the body, at the moment they touch or breathe upon it, they partake instantaneously of the life of the soul, which feels what the peculiar modification is, and what it represents. And as every organ must undergo modification before it can feel, so it is passive, not active; that is to say, sensation is a passion and not an action.

## CHAPTER XI.

*The ideas of the memory are similar modifications to the images of sight, but fixed in the organs, whereby they present themselves to imagination and thought, as external objects present themselves to sight.*

The memory is the field of images spread before the internal sense, (which images however are living, and constitute ideas,) as the visible world is the field spread before the external sense of sight. The images of the memory present themselves in this wise to imagination and thought. Therefore the internal sense as well as the external must be admitted to be passive; though passivity is especially predicated when modifications are insinuated immediately through the outermost avenues of the external senses.

## CHAPTER XII.

*By the instrumentality of sensations the soul desires to know what is going on in the world below it, whither it descends in forming the body, and the sensory and motory organs.*

The soul, which is a spiritual and celestial form, can have no share in, and enjoy no consciousness of, those effects and phenomena that take place in a world so far away from it and so much beneath it, unless by the instrumentality of organs which are exactly conformable to the forces of that sphere, and unless there be a scale of organs and sensations, to admit of the descent from above to below, and *vice versa*. The organic body is framed to meet the case. The scale or ladder has distinct steps or degrees, which make it possible to pass successively from one region to another. By this means nothing whatever can happen without the soul having a share in it. All sensation is raised from the lowest world to the soul as its heaven, and all action passes down to the lowest world from the soul as its heaven. Hence it is not what enters the soul that emperils it, but what comes forth from it; *i. e.*, not sensation, lust, or desire, but actions and effects. By touch the soul feels the presence of whatever in general comes against the body: by taste, it feels whatever is floating in water and other liquids: by smell, whatever is floating in the atmosphere: by hearing, all the modifications of the same atmosphere: by sight, the corresponding modifications of the ether, and all the beauty which the earth brings forth: by the innermost sense it feels whatever is done in the upper world, and in the region of causes and principles. And so forth.

## CHAPTER XIII.

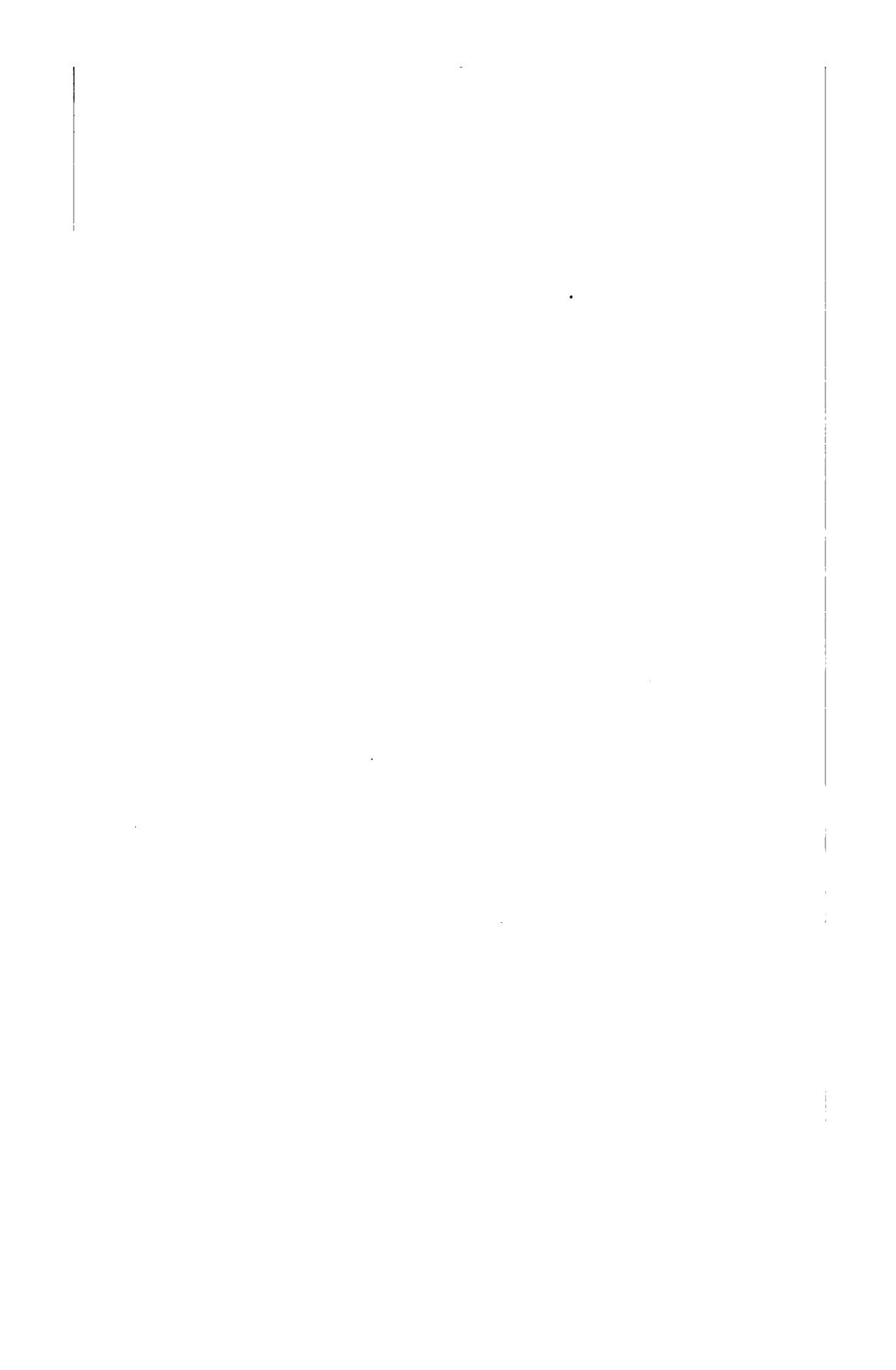
*The organs of the external senses are constructed with the most elaborate reference to the whole form of forces and corresponding modifications.*

The eye is exactly suited and made to the modification of the ether; the ear, to the modification of the air; the tongue,

to the forms of angular bodies ; so likewise the membrane of the nares. And that the cortical gland is fashioned to the form of the modifications of a higher ether, may be concluded from various phenomena. To mention only one or two specific arguments. The ear is furnished with the tympanum, with the fenestræ, with cylinders, with the cochlea, the malleus, and other machinery, which constitutes it the most perfect exemplar of acoustic art. So the eye in its orbit represents the master-piece of optics, being framed with express relation to all the nature of the influx of the solar rays. The same too may be said of the other sensories, in which nature's inmost secrets lie concealed and represented. The consequence is that the soul, which is the formative substance and force of the body, thoroughly knows, sees and enters into nature itself, and so moulds her instruments that they present not the slightest oppugnancy to the order and form of its fluxion. For the soul is in a manner above nature ; and hence is the science, art, order, and law of all lower things in the microcosm ; wherefore in acting from science, art, order, law, the soul acts from itself.

## CHAPTER XIV.

\* \* \* \* \*



**THE ORIGIN AND PROPAGATION OF  
THE SOUL.**



## THE ORIGIN AND PROPAGATION OF THE SOUL.

### CHAPTER I.

*The soul of the offspring comes from the soul of the parent.*

No one, I imagine, doubts that the first soul, I mean, the soul of the first man, was created by God immediately, and infused into a new body; in fact, that his soul, which perhaps was like a vegetable soul, or was not only spiritual, but natural too, was so purified as to acquire a spiritual essence and nature. The vegetative soul differs from the living souls of the animal kingdom, especially in the circumstance of being not only a spiritual but also a natural form; that is to say, in having the lower forms, as the first, second and third natural, added to it; but when these natural forms are cast off or separated, a pure spiritual form, such as the human, remains. But let us dismiss these speculations. Any one may frame guesses indeed, but let no son of earth pretend to penetrate into the mysteries of creation. Our only intention at present is to treat of the successive origin, or propagation and transmission, of souls from one body to another.

It will be impossible to doubt that the soul of the offspring comes originally from that of the parent, if we consider that the soul is all in all in the whole and in every part of the body, (it is all in all in the simple fibres, and is the principal and ruling essence in both the white and the red blood); that it is an essence so real that it alone is, lives, feels, acts; that the soul is the veriest creative and formative substance of the body, that is to say, the informing substance of all the organic forms, whereof

the body is the last. Without the soul or first form no organic forms could possibly be engendered or exist. Whatever is to undergo formation, or derivation, successively, must always begin from a first form. We shall be further confirmed in our view of the origin of the soul, by attending to visible phenomena: to the likeness to both parents which the common offspring exhibits both in mind, disposition and body; a likeness not merely observable in man, but in the brute creation; and even in the subjects of the vegetable kingdom, in so far that like procreates like. In the animal kingdom the image and likeness of the parent are transmitted to the children's children; nay, from Adam to his universal posterity. Moreover there is a general and specific, and even an individual likeness in families, which if it does not pass immediately to the next descendant, only runs onwards another stage, to the grandson or the great-grandson: while in each instance the family likeness is constantly preserved, which distinguishes it from other families. If then the organic body is the type, image and picture of the soul, and if the body originates from the soul or the first form, it follows that the soul of the offspring must be from the soul of the parent. This is again corroborated by the examination of the generative organs in both sexes, from which, if we follow their anatomy, and the visible experience of phenomena, we may clearly deduce the manner in which the first essence of the bloods is disposed for procreation or propagation. The soul, as we indicated above, consists of innumerable simple substances or first forms. Thus the soul of the parent is propagated in the offspring, although the whole of it is not transferred, but only such a share, or if we may be allowed the expression, such a minute portion, as will suffice for initiating the organic or corporeal forms.

#### CHAPTER II.

*The soul of the offspring is conceived in the male, but clothed in successive order with the requisite organic forms of the posterior sphere, in a word, with the body, in the ovum and womb of the mother.*

This proposition is plainly enough attested by the generative

organs when intimately examined and considered. It is proved, we say, by the spermatic arteries, veins and nerves; by the testicles and seminal vessels, and the epididymides attached to the upper border of the former; by the vesiculae seminales or cellular receptacles; by the prostate glands at the neck of the bladder; by the urethra, and Cowper's and Littre's glands; by the seed itself, and the living animalcules it contains: moreover, by the corresponding organs in the female, as the uterus, the Fallopian tubes, the ovaries, and the other members; than all which, universal nature offers no more wonderful spectacle to human eyes. But the offices of the several organs of this series, can only be explained in our special Treatise on Generation. I may however state, that on opening them up into their causes, I seem to have discovered a connexion and progression in those causes which prove that the first rudiments of the brain are conceived in the organs of the male; and by the first rudiments, I mean the purer cortex contained afterwards in the cortical gland; and that the organic forms are projected from this as the initiament of the body, and afterwards, so commenced, advance successively in the ovum and womb of the mother, thereby producing the body. This successive order is also proved by the growth of the little members of the chick in the egg. If the posterior forms are to be engendered by their first form, this must be accomplished successively. Nothing that involves coexistence can exist all at once or simultaneously. Did it so exist, the last organic forms could never arise from those next above them, nor these again from the first form. In short, the body could never exist from its brain, or the brain from its cortical glands, or these from their simple cortex, or this from its soul, which is the first, highest, inmost, simplest, and most perfect form. Without the cortex not a fibre is produced, and without the fibre no organic form.

## CHAPTER III.

*The simple animal substances or primary forms are conceived and excluded by a transcendent process in the simple cortex, and so the soul is procreated in every living creature.*

The simple cortex, or that which is the intimate agent in

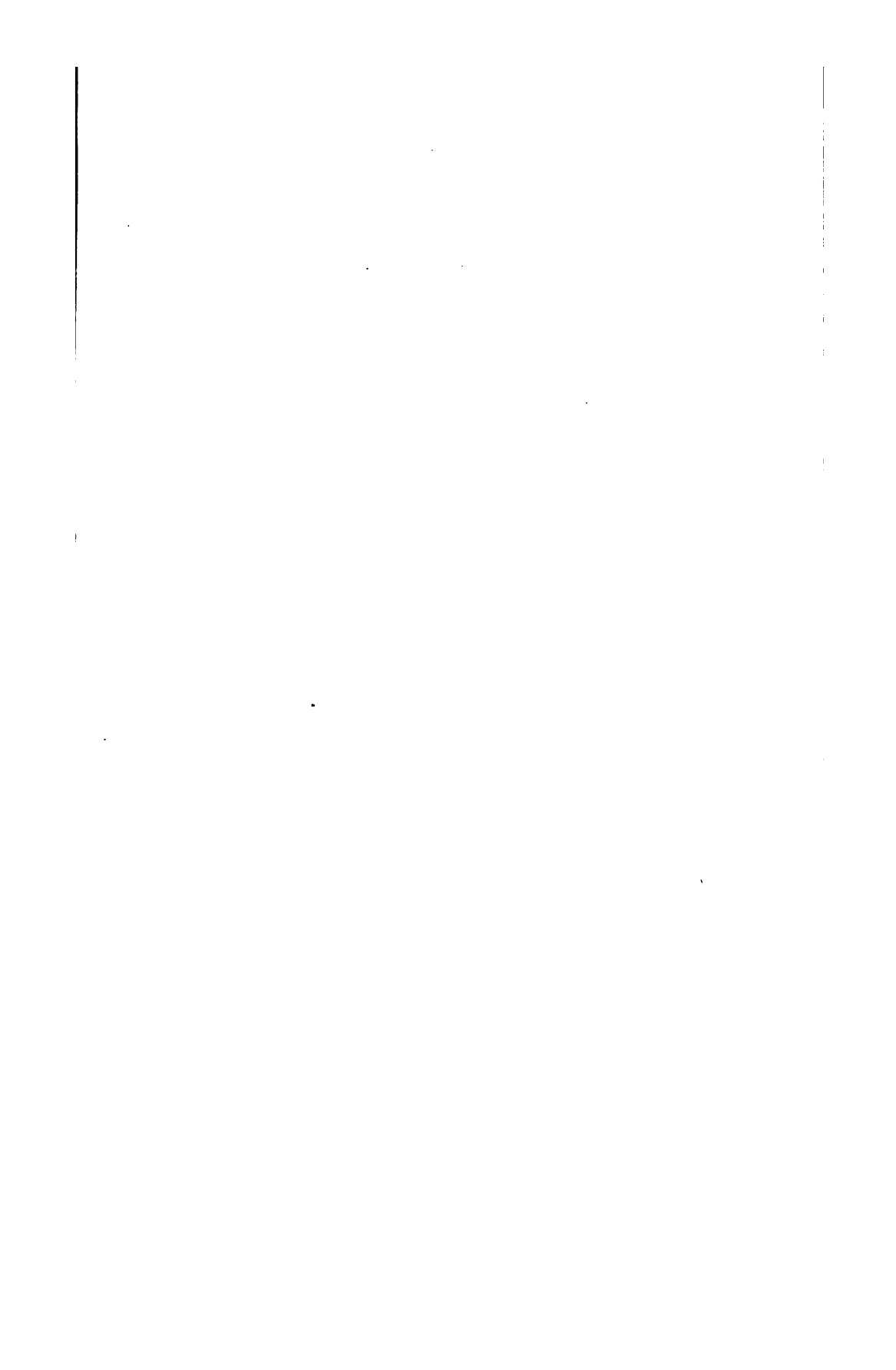
the cortical glands of the brain, is the first of the soul's organic forms, and its operation is intellectual or rational, being that of human thought. In this simple cortex and nowhere else can the first animal essence be conceived and procreated. Thought or the operation of this cortex is even spiritual in its nature, and actually undergoes infinite changes of state, containing as in a centre, and contemplating in a single simple idea, all things that there are in the body. As soon therefore as ever this form is conceived, it is conveyed into the simple fibres, and by them to the universal body ; for the simple fibres dart from this cortex as rays of the soul's intellectual light. But this conception and generation are effected in a transcendent way. As the brain is the organ for the preparation of the red blood, so the cortical gland is the organ for the preparation of the purer blood or animal spirits ; consequently the simple cortex is the organ for preparing the first essence of the blood or the first living essence. These cerebra and cerebellula mutually correspond to each other in succession. But as this generation is not effected by the cortex, but in the simple cortex, and this, by a transcendent process, so it will require to be investigated from the laws of order and by the doctrine of forms. Therefore the subject does not admit of a short statement.

## CHAPTER IV.

*The body and the animal kingdom are at an end as soon as ever this living spring and perennial source of the soul are arrested.*

If in the whole body there be nothing substantial and alive but the soul, and if the soul be the one only substance that reigns universally in all singulars, and most singularly in its universe ; and if it be the source from which all the organic forms are derived, including at last the ultimate form or the body : if moreover it be the principal and intimate essence of the animal spirits and the red blood, and so prolific as to afford initiaments for the propagation of new forms,—if all these predication of the soul be true, it will follow that it must arise unceasingly, in adaptation to all the uses and neces-

sities of the kingdom, and spring from the above source. This is clearly proved by failures of the spirits originating from a vast diversity of causes, and followed by ailing conditions of the animal mind, by dimness of sight, lipothymia, syncope, deliquium, paralysis, stupor, sleep, loss of memory, languor of imagination, dullness of thought, indeterminateness of will, loss of desire, extinction of vital heat, premature old age, and an infinity of other effects.



**ACTION.**



## ACTION.

### CHAPTER I.

*The action of the whole body, its viscera, and their parts, is performed by the motive fibres and the muscles.*

THE early stages and successive growth of animal embryos, afford clear proofs that muscle and muscular action are ultimate determinations. The simple fibre which comes first of all, immediately that it springs from its natal cortex, forms or builds the medullary or nervous fibre by a process of convolution, and the latter again engenders the blood-vessel. This is in order that the nervous fibre and the blood-vessel may construct the motive fibre of which the muscle is composed. Thus the motive fibre, by means of which action is produced, is the last or ultimate determination. There is however the simpler motive fibre and the compound. The simpler is composed of nothing but nervous fibres and capillaries, the latter containing the purer blood. The compound is made up at one and the same time, of nervous fibres, capillary vessels, and of the vessels which carry the red blood. Both a nerve and an artery go to every muscle. Meanwhile, the universal body, the viscera of the body, and the parts of the viscera, are constructed of nothing but motive fibres ; the reason of which is, that all things therein are born and made for some action, that the soul may be represented in a type by real actions in the extreme sphere ; for the soul would never be justly manifested in the ultimate world, unless it became active by the muscles.

## CHAPTER II.

*The body is so articulated by the muscles, that there is no part without its peculiar motion and action.*

The first inspection and contemplation of the animate body when stripped of its integuments, is sufficient to shew, that the whole frame is so distinct and articulate with muscles, as to represent all possible actions whatever that are conformable to the operations of the soul. The heart is in all respects a muscle, and so articulate, that it admits of being expanded, compressed, flexed and reflexed in a thousand ways; and its auricles the same. Likewise the lungs, the stomach, the intestines, the liver, the diaphragm, &c. Which shews that everything belonging to the body, everything corporeal, is also muscular, or what amounts to the same thing, is ready for motion and action. There is not a single artery but is begirt by muscular circles, to accommodate itself to the blood and the fluxion thereof. The same may be said of every fibril in every circle. This is very plain in the fibres, which are the minutest parts of the body. Every one of them enjoys its own peculiar activity, though on such conditions, that it is bound down to act for the community it belongs to at the same time as for itself. Such also is the condition of the parts of the whole body and all its viscera. Therefore whatever part therein is not active, cannot of right be regarded as living or animate; since it is the end of formation in every part, that such part should operate answerably to the force of the soul.

## CHAPTER III.

*Each individual part of the animated\* body has its own proper motion, and each action consists of an infinity of motions as its parts.*

That each, even the very least, individual part has its own peculiar activity, is a point which receives an especial attestation

\* The translator has preferred to retain in general the term *animated* rather than to use the more English word *living*; because the former appears better to express

from the growth of the embryo in the womb, and of the chick in the egg. Each several fibre is so separated from its companion, at the same time that it is linked to it, and bound down to serve it, that it at once attends to its own interest and subserves the common weal. In the periods however of advancing life and old age, the fibres either grow together, or they are parted asunder, and confused and indistinct action is the result. Indeed when one part acts either separately from, or altogether unitedly with, another, there can be no liberty, and where there is not liberty there cannot be harmony. In proportion then as the viscera, and the parts of the viscera, are distinct and free, at the same time that they are unanimous and actually united in guarding the common weal, in the same proportion their state is perfect. These are in fact the only conditions on which the body can comply with the bidding of the mind, which operates in the highest sphere of singulars. This is corroborated by experience, for the obedience and soundness of the body are lost as soon as ever the parts either grow together, or separate from each other.

## CHAPTER IV.

*The character of the action is determined by the nature of the muscle.*

If muscle be the instrument or organ of action, then it follows that the form of the action must depend upon the position, connexion and quality of the muscular fibres. A muscle consists of a fleshy belly and a tendon, which may be divided into other lesser parts exactly similar to the larger. The tendon too is partible into the same number of fibrils as the muscle. Furthermore the muscles are enveloped in several membranes of a thin and cellular nature. Both an artery and a nerve enter every muscle; and when the muscle undergoes motion and re-

that master idea of Swedenborg, that man is not a life, but an organism recipient of the One Life; and that the doctrine of pure life must be referred to theology, not to physiology or psychology, or any branch of philosophy; moreover that we look in vain in ourselves for a self-intelligent soul. See the Index to the *Economy of the Animal Kingdom*, article SOUL.—(Tr.)

laxation, the blood is reciprocally expressed from it, and attracted to it, with great force. The form of the muscle, and the form of the action, depend conspicuously on all these circumstances. The precise nature however of the several moving fibres has not yet been investigated. But meanwhile that the action is altogether dependent on the state of the muscle, is clearly shewn in paralysis, tetanus, spasms, and convulsions; and by the division, relaxation, tearing and obstruction of the fibre or the artery supplying the muscle. Therefore the form of the action is as the form of the muscle.

## CHAPTER V.

*The body lives in acting, and acts in living.*

The body is said to die when it ceases to act; and the more perfectly it acts, the more perfectly it lives; therefore when a member is deprived of its action, it may be regarded as extinct. The body including its members is the ultimate form of the soul. The members are not alive, unless they live, that is, act, at the bidding of their mind. They are but ultimate determinations, which do nothing of themselves, but act from a higher power, which determines them, and has life in it. Hence action is the life of the muscles. This is the reason why death seizes the members, the limbs, and the muscles, in the first instance, and advances by degrees to the inner parts. For we cease to act before we cease to will to act, that is, to live.

## CHAPTER VI.

*Without the animal spirit, and without the blood, or without the fibre and the artery, no muscular action can exist.*

This is clear from experience, since both a nerve and an artery enter every muscle. The nerve with its fibre vanishes altogether away in the muscle; while the artery divides and ramifies through its body in such a manner, that the muscle appears entirely arterial and sanguineous; besides which the

artery has a corresponding vein. Hence it appears that muscle is constructed entirely of arteries and veins; or contains no prevailing element besides the artery and vein, or in other words, besides the blood and the animal spirit. When therefore the artery or nerve are injured, divided, compressed, or relaxed, the action of the subject muscle is lost at once in proportion to the degree of the mischief. But our theoretical examination of the fibres and vessels, or of the animal spirits and the blood, shews us also how these two elements respectively flow in. The blood-vessel is in fact composed of nothing but fibres. When therefore the fibre acts, the artery is constricted, and the blood expelled; and when the fibre does not act, the blood rushes in, and recovers the artery. Hence the reciprocal action, or the action and reaction of the muscles. The blood is passive, and reagent against the spirit, which is active. The tissue of the motive fibre, however, cannot be made clear to the evidence of reason without a previous citation of experimental data.

## CHAPTER VII.

*There are three general sources of motion and action in the animal body; namely, the animation of the brain, the systole and diastole of the heart, and the respiration of the lungs; besides which there are many specific sources, and innumerable particular ones.*

The actions of the animal body constitute an entire series, order, and form. They may be classed under superior universal, and inferior universal, or as general, specific, and individual. One is under another, and one is in another, just as is the case with substances; for action proceeds from substances as its instrumental causes. The animation of the cerebrum, cerebellum, medulla oblongata and spinal marrow, is the most universal source of motion and action in the body, and the whole nervous system, that is, the organic body, is inspired and vivified with its active spirit by this animation. The systole and diastole of the heart are a less universal source, since the motive

fibres of the heart as well as of the arteries and veins are dependent upon the inspiration of the nervous fibres. The respiration of the lungs is a source still lower in point of universality, and conspires both with the animation of the brains, and with the systole and diastole of the heart. The other motions of the body, or as we term them the special motions, may be likened to streams flowing from the above three sources or fountains. They comprise the motions of the several viscera and members. Every member has its own proper motion and proper action; and this is true whether we apply it to the stomach and the intestines, or to the liver, pancreas, and spleen, or to the arms, loins, feet, fingers, or toes; in short, as we said before, it is the case with all the members in the body. There are also particular motions in every viscus, motions for instance of the glands, vesicles and delicate muscles of which the entire member or viscus is composed. These motions again involve motions more particular still, as of the motive fibres in every the smallest muscle, and in every gland; of the arterial and venous vessels in these, of the nervous fibres in these, and of the simple fibres in these; and so forth. The bodily system is perfect in proportion as the singular activities are perfectly distinct, and yet conspire in finer harmony with the universal.

## CHAPTER VIII.

*Speech is the action of the tongue, larynx, trachea and lungs.*

In the enunciation of the articulate sounds of the voice, the tongue, which is in all respects muscular, has to be folded in different ways, and the fauces also applied, while the chamber of the larynx is moulded after the nature of sound, and likewise the trachea. The lungs also which supply the air, are required to accommodate themselves to all the other parts. Thus innumerable motive fibres necessarily conspire to the articulation of a single sound. But the action of the tongue differs from that of the other members in no respects but velocity and volatility. The motions of one member may be extremely rapid, those of another slow and sluggish. This is shewn in birds

and insects, whose wings vibrate with such rapidity, that the alternating activity simulates continuous repose, and comes to the ear as a murmuring sound. The speech of the tongue comes from the same source as the other actions of the body.

## CHAPTER IX.

*The cortical glands in the cerebrum and cerebellum correspond to the motive fibres in the muscles of the body; consequently the action of the cortical glands corresponds to the action of the muscles.*

The nervous fibre exists from the cortical gland, which latter therefore determines it. On the other hand the motive fibre of the muscle is the ultimate determination of the same fibre, for the latter terminates in it. Therefore the first and the last, or the two extremes, cannot but mutually correspond to each other. Thus the cortex of the cerebrum and cerebellum is the agent, and the fibre of the muscle is the patient, in other words, is obliged to act according to the force impressed by the efficient cause. The motive fibre is the cause of action; the cortical gland is the principle causing the fibre to act. Thus the whole action of the body comes forth from the active force of the cortical cerebrum and cerebellum.

## CHAPTER X.

*There is not a cortical gland in the cerebrum but corresponds to a particular motive fibre in the body.*

A single medullary or nervous fibre proceeds from every cortical gland, which fibre is conveyed into the body to take a share in some sensation, or in the production of some action; consequently is conveyed to its correspondent motive fibre. One and the same fibre cannot perform two offices at its extremities, cannot influence two motive fibres, for an indistinct action would be the result. For this reason there is the same luxuriant supply of cortical glands in the cerebrum, cerebellum, medulla

**oblongata, and spinal marrow, as there is of motive fibres in the body.**

#### CHAPTER XI.

*The cortical gland of the cerebrum and cerebellum cannot act on its corresponding motive fibre of the body,\* without an active or living force, that is to say, without expansion or constriction.*

Much the same may be said of the artery, which cannot act upon the blood, or through the blood upon the ultimate parts of the organization, without the active force of the heart, namely, its systole and diastole; for when the heart stops, the pulse and action of the blood cease. So also the cortical gland, which is the smallest type of a heart, a true corculum; and without the expansion and constriction of which, the animal spirit could never be expelled, or excite the motive fibre to act. Absolute repose in the principle must be followed by repose in the effect depending on the principle. But experience proves that the cortical glands respire and animate, and thereby drive the agent spirit into the extremes of the muscles. The cerebrum perpetually rises and subsides, or animates, which action can only begin in the cortical glands, and not immediately in the vessels and fibres. This is apparent from the phenomena of apoplexy, epilepsy, catalepsy, and the several diseases affecting the brain. The moment the arteries, or even the veins, of the brain are obstructed, and the cortical glands are from any cause deprived of room for action, the action of the muscles and the sensation of the organs cease.

#### CHAPTER XII.

*The cerebrum is articulated and subdivided in such wise, that it can excite to action a greater or lesser number of the cortical glands, and so produce by the muscles any action that it pleases.*

The cortex of the cerebrum is so divided and subdivided as

\* See the note p. 4, above.—(Tr.)

to enable every several gland to expand and contract ; likewise a greater or smaller number of glands, or a complete group, or even the whole at once. Winding channels, furrows, depressed lines and free spaces intervene between its parts, and distinguish each partition. The cerebrum has the power of rendering active any fibres or forces that it chooses, and therefore the motive forces of the body. It follows that it can animate or excite to action an entire muscle at one time, part of a muscle at another, and a second muscle and a part of it simultaneously with the first : also that it can in a moment transfer the action from one muscle to another, and so produce the form of any action harmoniously and delightfully.

#### CHAPTER XII.\*

*Voluntary action is a special and particular animation or excitation of the cortical glands of the cerebrum, subordinate to its general animation.*

The fact of the expansion and constriction of the whole cerebrum, in no wise hinders its parts also from expanding and constricting one by one in a different manner from the whole. No general motion or action ever hinders or prevents special and particular motions, but rather facilitates them. The circumstance of an organ being capable of rising and moving by itself, depends entirely on form, that is to say, on position and connexion of parts. The situation and connexion of the cortical parts of the cerebrum is such as to allow of this ; and hence its voluntary endowment. But when the cortical glands are as it were tied and compacted together, and their finest interstices and divisions obliterated, as in sleep, lethargy, carus, then this voluntary faculty or activity ceases. As soon however as they are again raised up, which takes place in waking, they all rouse to voluntary action. It is therefore the animation of the individual glands that produces action ; for by this animation the animal spirit is transmitted into the motive fibres wheresoever they are grouped or situated. It would therefore be a worthy enquiry to institute, where the cortical glands are situated in the brain that correspond to one or the other set of motive fibres

in the body ; *i. e.*, whether in the vertex of the brain, in its border, or in its very substance ?

## CHAPTER XIII.

*Spontaneous and natural action proceeds from the general animation of the cerebrum and cerebellum, undistinguished by any particular animation.*

Spontaneous and natural action are opposed to voluntary ; the former being general, consequently indiscriminate, indistinct and obscure, while the latter is discriminate, distinct, and peculiarly the attribute of parts or singulars. The cerebellum is not divided into masses, limbs and groups of parts, all distinctly moveable, in the same manner as the cerebrum ; and hence it is that the action of the cerebellum is natural, but that of the cerebrum voluntary ; for the same reason also the action of the cerebrum is natural, because general, during sleep. The peculiarity, however, of the action of the brains in different animals, and of the actions of the medulla oblongata and spinal marrow, is amply shewn by the form and state, or by the situation, connexion, and coexistence of the cortical glands and the muscular fibres corresponding to them. It is the form which makes everything what we find it to be. Moreover the cortical glands of the cerebrum, enjoying, as they do, the power of separation, may be put on the stretch to any particular degree, as in the waking state. It is worthy of remark, that the general animation of both the cerebrum and cerebellum, causes the muscles all over the body, (with the exception of those of the lungs and heart,) although perpetually in action, to keep their equilibrium by means of their antagonists.

## CHAPTER XIV.

*Most of the muscles of the body are supplied with the fibre of both the cerebrum and cerebellum ; and hence are capable of both natural and voluntary action.*

We may infer from the action of the limbs and muscles of the body, that the fibre of the cerebrum, or the voluntary mo-

tory fibre, hardly ever runs by itself to any muscle, but is most commonly associated with the fibres of the cerebellum. Thus in the waking state all the voluntary muscles stand in perfect readiness to execute the orders of the cerebrum, while during sleep they live under the auspices of the cerebellum. In fact I scarcely think there is a single voluntary muscle that is not supplied also by the fibre of the cerebellum. And in the head itself the fibres are commixed in this wise. The fibres of the cerebrum marvellously intertwine and clasp with the fibres of the cerebellum, first in the annular protuberance, next in the neighborhood of the testes, and lastly in the spinal marrow. Indeed they may be said to run in wedded pairs in every nerve and in every muscle. This is especially manifest in the lungs, which breath by night as well as by day, whether the cerebrum is asleep or awake. So complete is the union of influences, that not a single act of respiration happens during the day, in which the natural and voluntary powers are not really commingled; as we may all observe by carefully attending to the play of our breathing. In fact respiration is exactly suited and proportional to the state of the cerebrum, including the animus and mind of that organ. Some of the viscera of the body, however, are purely influenced by the fibre of the cerebellum, as the pharynx, stomach, intestines, mesentery, heart, liver, pancreas, spleen, testicles, epididymides, &c. Other viscera again partake equally of the fibres of both the brains, as the trachea, lungs, and eyes: and there are others in which the fibre of the cerebrum prevails; as the muscles of the head, neck, chest, abdomen, arms, loins, legs, feet, fingers, &c.

## CHAPTER XV.

*Action is determined by the cortical glands by the process of expansion and constriction; nevertheless, the power that expands and constricts the glands, or excites them to act, resides within the glands themselves.*

The expansion and constriction of the glands, causes the expression of the animal spirit into the nervous fibres, and

through them, into the motive fibres ; and action is the result. In this way the gland is determinant of actions. The gland itself, however, must be determined by some relatively intimate and higher force, for it cannot determine itself. In the gland then there is a living element, which can will, enjoy power, and also act ; that is to say, which can in a moment excite the glands to act in one distinctive manner. The cause of action is still therefore a matter for deeper enquiry, and when we institute such enquiry, we find a prior cause in a certain purer, more intimate and simple cortex, which is contained in the gland itself as in its own most diminutive brain. We have treated already of this simpler cortex, and shewn that our intellectual or rational mind resides in it, whose office it is to perceive, think, conclude, will, and determine into act. This gland is furnished besides with its own most simple fibrils and vessels, and assumes different states according to the changes of the mind. Therefore the mind itself is determinant of the action of the gland, and this, of the action of the muscles. But the first determinant of all is the soul, without whose consent nothing whatever can take place.

## CHAPTER XVI.

*We view and contemplate with the mind the whole action before it exists.*

Compound actions exist by the motion of the different muscles, and of the different motive fibres therein. The muscles and fibres are determined by a higher power and force. This power and force reside in the cerebrum, which is the source whence actions are derived. The cerebrum has the power of thinking and willing ; the body on the other hand has the power of acting, and of executing thoughts. Hence when the cerebrum is injured, obstructed, or clogged, the faculty of thinking and willing is lost ; and therewith the faculty of acting is lost in the body ; as we find in catalepsy, epilepsy, apoplexy, lethargy, and other diseases. And as the actions of the body proceed from the cerebrum, so they proceed undoubtedly from the mind of the cerebrum. Even speech itself, which is a joint action of

the tongue, lips, palate, larynx, trachea and lungs, never exists without premeditation, or a previous view of what is to be said: therefore the character of thought determines that of discourse. Walking, jumping, the tossing of the arms, gesticulation, change of countenance and expression, and other actions, are not of spontaneous origin, but come by command. The body, which is commanded, merely obeys. It follows that we embrace in the mind in the first instance the whole action of the body.

## CHAPTER XVII.

*An action is an idea of the mind represented in the body by the ministration of organs; hence the whole body is moulded to the image of the operations of the mind.*

The harmony subsisting on both sides between the mind and the body, has been a subject of anxious enquiry for many ages. We find every moment, as a matter of experience, that the organic frame rushes into action corresponding to the foregone ideas of the mind; which proves that something which is incorporeal or immaterial, excites the heavy mass of the body to all the numerous acts and operations that it pleases. This cannot be ascribed to mere correspondence; for action and motion never can exist without implying an active force actually impressed. It is clear from what has gone before, that there is no thought without a change of state; and that this change of state takes place in the cortical gland, from which the fibres are derived; also that the cortical gland must be actually expanded and constricted, to drive the animal spirit into the fibre of the cerebrum, and so into the motive fibre of the body. Experience completely establishes the fact, that the muscles are actually dilated and constricted, and the limbs in this way set in motion by means of the tendons. Hence it appears, that all things in the body are so framed as to act completely at the bidding of the mind; *i.e.*, that the body is the image of the mind's operations. And thus in setting about to form or create its body from the ovum, the soul views in itself or its ideas, all those operations as already existing in act in the body; the soul regards the body as if it

already saw, heard, tasted, spoke, walked, moved its arms and its fingers, and its viscera likewise, its heart, its stomach, its intestines. The result is an answerable organization, as the marking of the foetal body is the result of the imagination of the mother. Nature which is the instrumental cause, is so constituted, as to obey the spiritual essence in all things;\* as also afterwards, when the body is entirely formed, in actions themselves. In the soul then there is everything in potency that there is in the body in act. The very body declares every moment that it is the image of the operations of its soul.

## CHAPTER XVIII.

*Any habitual action recurs in a manner spontaneously with the whole of its form by virtue of the mere force impressed by the mind, almost in the same manner as a natural action.*

As appears from speech; for the tongue, the lips, the cavity of the mouth, and the trachea, fold and roll, without a moment's hesitation, to enable them to articulate the whole of the voice or sound. They run into actions that have become habitual; which actions, however, must have been often repeated and have become familiar previously. The like takes place in singing. So also the eye turns in a manner spontaneously to objects. And again the fingers run automatically over the strings of the lyre, or the harp. During the action of walking also, the feet and

\* The above sentences involve an important doctrine in reference to nature as the habitation of human society. For as the body is constructed beforehand with express reference to all the natural actions that the individual will ever have occasion to perform; so nature, and the human organization considered as a part of nature and a mutable subject of the providential series, are constructed with a foregone reference to all the states, arts and requirements, that humanity, as a created thing and a compound individual, can possibly imply. The world then, in its fundamental conception, contains a promise of the express gratification of every good natural affection, every true natural thought, and every just sensual want in its minutest detail, and in its entires compass. Neither the body nor the world are in themselves hindrances, but on the contrary means, to fulness of satisfaction and universal competence, *Quærite et Invenietis*.—(Tr.)

the footsteps once entering the way, go on without any further notice. Not to mention the gestures and actions of dancers, harlequins, actors, and other performers ; in all of whom, however, every act must have been acquired, before it can be continued in this manner ; after which habit becomes second nature. But the mode in which this is brought about, is explained by the anatomy of the cerebrum, medulla oblongata and spinal marrow. The cortical substance of the cerebrum sends down fibres innumerable to both these marrows, which it associates with their own proper fibres. Thus the medulla oblongata and spinal marrow are compelled to act at the bidding of the cerebrum or of the mind in the cerebrum. And when this harmony is well established by frequent use, then the cineritious substances of these marrows, at the first sign from the cerebrum, rush into convenient actions, as if the cerebrum commanded them all. The precise organism, however, for carrying out this effect will be explained in the Parts on the Cerebrum.

## CHAPTER XIX.

*There is both internal action and external, and an actual harmony is established on both hands between them.*

Internal action is thought and an attribute of the mind ; but external action belongs to the body. Internal action or thought is performed in the innermost parts of the cerebrum, or in the purest organic or cortical substances ; external action is performed in the outermost parts, or in the muscles of the body. Action is change of state ; so also is thought ; indeed the latter can have no existence apart from change of state in the cortical glands ; nor yet can the action of the body, without a change of state in the muscles, and consequently in their motive fibres. Between these two actions a firm harmony is established by the fibres, which begin in the above-mentioned glands, and end in the muscles ; so this harmony is actual. Even the manner in which the most delicate fibre with the most yielding spirit can produce such great and grave effects, may be understood if we consider, that in the whole muscle there is

nothing substantial but the fibre, and that during every act of expansion, this fibre expels the blood, which is gravitating or heavy, and during every act of constriction, admits it. As this is done in the infinite minimal points of the motive fibre, and hence in all points of the muscle, so of necessity it is done in the whole muscle, and implies the action of the whole muscle. The compound derives all its force from simple substances and forces. The exceeding minuteness, the nothingness, according to our ideas, of that which can move masses in space, may be concluded from all the effects of nature, nay, even demonstrated by calculation.

## CHAPTER XX.

*There can be no force without action, no action without change of state, no change of state without an idea of motion: that which thence results constitutes an effect.*

According to the common rule, force supposes action; action supposes change of state; and change of state supposes fluxion, which cannot be conceived apart from the idea of motion; again motion supposes an effect. Thus the sufficient reason for the actuality of the effect is contained in active force as the efficient cause. The soul or the intellectual mind\* is the supreme force of its kingdom, and cannot exist without thought, which is internal action. This action, viz., thought, supposes a change of state in the cortical gland. This change of state cannot be conceived without change of the essential determinations, or the form; and hence not without variation of position and nexus in the simple fibres and other substances in the beforementioned glands; or without the idea of motion. The result is sometimes termed an effect, sometimes a phenomenon. Therefore the effect of internal action is external action; and the effect of external action is that which is produced by action, and intended by the mind: thus the end coincides and conspires with the effect. But I say that there can be no change of state without an idea of motion. It is true there may be such change with-

\* In the *Economy* the author makes a great distinction between the soul and the intellectual mind.—(Tr.)

